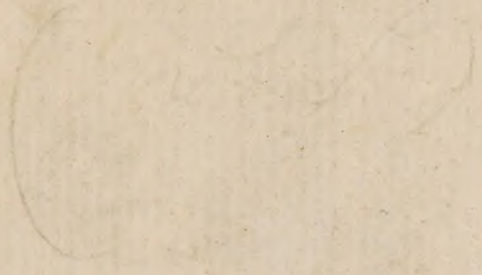


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M. F. Gucht Sculp.

*JAMES
M.*



*D. R. A. K E
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Anthropologia Nova:
 OR, A NEW
 SYSTEM
 OF
 ANATOMY.

Describing the
 ANIMAL OECONOMY,
 And a Short RATIONALE of many
 DISTEMPERS
 Incident to
 HUMAN BODIES.

Illustrated with above Fourscore FIGURES,
 drawn after the Life.

By *JAMES DRAKE*, M. D.
 Late Fellow of the College of Physicians and R. S.

The THIRD EDITION Corrected.

WITH
 A PREFACE by *W. WAGSTAFFE*, M. D.
 and Reader of Anatomy at *Surgeon's-Hall*.

In TWO VOLUMES.

LONDON:
 Printed for *WILLIAM INNYS* in *Pater-noster-Row*.

MDCCCL.



T H E

P R E F A C E.

IT is an Unhappiness that amidst the Multitude of Authors in *Anatomy*, from the time of its Infancy to this Day, there are so few who have treated it with a laudable Exactness, or suitable to the Dignity of the Subject. For an *Anatomist* ought to have not only a Penetration and Sagacity requisite for the making Discoveries, and a Strength of Judgment and Readiness of Conjecture to reason on them, but to be endow'd also with a Talent of expressing his Notions with Advantage, and, as they are to himself, of rendering them intelligible to other People.

That we are indebted to the Skill and Accuracy of the Hand and the *Use of the dissecting Knife*, the present Age, and our own Nation in particular, can furnish us with many Instances. There are some *Physicians* among us, as well as those to whom this *Province* more peculiarly belongs, who are such excellent Masters in this Art, that as they want not the Commendation of their Countrey-men, so they are not afraid of the Criticism of Foreigners.

But no one, I am sure, ought to set up for an Author, or indeed for an *Anatomist*, until he is able to enter upon the *Rationale*, and to enquire into the Nature and Causes of those *Phænomena*, which the *Cunning* of his Hand discovers to him. For, notwithstanding he may be vers'd in the *Anatomical Encheiresis*, he may find perhaps that he is unqualified for drawing Consequences and Conclusions; that his Head is not altogether so ready as his Hand, nor his Reason so easy to be managed, as his *dissecting Knife*.

How much and how eminently Dr. *Drake* excelled in all the Qualifications I have mentioned, the Learned World already have been Judges, and Posterity I am persuaded will reap the Benefit of his Labours. There is nothing omitted in this *Edition* except the Chapter on *Fermentation*, and the *Syllabus* at the Beginning of each Chapter, which is still continued in the Margin; and although our Author may seem less Bulky than he first appear'd, yet he is not less correct in himself, or less serviceable to the Public.

The Chapter on *Fermentation* was of so little use to any but the Chymist, and so foreign an Introduction to the other on *Digestion*, that it was left out by the Approbation of the most eminent, and the most accurate *Anatomists* of our Faculty. His Notions, it must be own'd, of the several various Methods of *Fermentation*, and the various *Hypotheses* contrived for their Solution, are so many undoubted

doubted Instances of his extensive Knowledge, and of his thorough Intimacy with the *Epicurean*, the *Cartesian*, and the *Hermetical* Philosophy. And as he was a Perfect Master of the *Operations* of the latter, so none has with better Argument, or clearer Demonstration unfolded the Incongruity of their *Principles*, in relation to Natural Philosophy, or shewed the precariousness of their Art. But all this however Rational, is extremely inconclusive when apply'd to the Mechanism and Motions of the human *Fabric*, when *Animal Fermentation*, if there be any such thing, is very different from what he has describ'd, and especially when in the Chapter on *Digestion*, he rejects all the *Ferments* and various *Menstrua* of the Stomach as the Product only of the Imagination.

And here the Reader will be informed of many things concerning the manner of *Digestion*, as well as the various *Organs* of it, which, if they will not serve for his Use, will contribute at least to his Entertainment. The *Comparative Anatomy* of the *Ventricles* of the several Kinds of Animals, gives a light into the Act and Uses of *Mastication*; and the many various ways by which the Aliment is dissolved, are perhaps enquired into, and discussed with a Force of Reason, and a Maturity of Judgment, becoming the Character of a great *Genius*.

But after all, it may be justly questioned whether, when he has destroy'd the *Hypothe-*

ses of those who went before him, his own *Principle of Dissolution* is not likely to undergo the same Fate; or whether in a Doctrine so *conjectural* as this, there can be any thing advanced, that is not liable to Objection. The manifold Inventions of the present Age are owing undoubtedly to a Liberty of Thought; and the Freedom of philosophizing, and an Error in an Author may sometimes give an hint, that may pave the way for the most valuable Discovery.

It must be confessed indeed that the Chapter on the *Menses* is altogether inconsistent and erroneous; but as he has pointed out the Opinions of Dr. *Charlton*, *De Graaf*, and others on this Subject, and especially that of Dr. *Freind*, it would be highly improper to omit it. The *Hypothesis* of the last, which is so Mechanically and so admirably calculated for accounting for all the Symptoms and Distempers proceeding from the *Catamenia*, is abridged in such a manner, as will be an Incitement to any one, who has any Curiosity to peruse at large that excellent* Performance, which stands irrefragable amidst the Batteries of Argument, and appears the more Rational, the more it has been assaulted.

As to any other Pieces of this Work, for my part I know of no Objection that is ma-

* *Emmenologia* : in qua Fluxus Muliebris Menstrui Phænomena, Periodi, Vitia, cum medendi Methodo, ad Rationes Mechanicas exiguntur. Auctore Johanne Freind, M. D. Coll. Med. Londin. & Societatis Reg. Socius. Editio secunda auctior & emendatior, 8vo. 1717.

terial; the Sentiments of others are candidly and ingenuously delivered by him, and like one who thoroughly understood them; and whenever he disagrees with, or assents to their Conjectures, or proposes any thing of his own, he gives his Reasons with the utmost Impartiality, without the Triumph and Ostentation of a Conqueror, or any fond Opinion of his own Merit.

If the Chapter on the *Motion of the Heart*, and the *Use of Respiration*, together with that on *Sanguification*, *Nutrition*, and some others are consulted, we shall find he does not behave himself like a mere Describer of the Parts, but like an unprejudic'd Enquirer into Nature, and an absolute Master of his Profession. And if Dr. *Lower* has been so much and so deservedly esteem'd for his Solution of the *Systole* of the Heart, Dr. *Drake* by accounting for the *Diastole*, ought certainly to be allowed his Share of Reputation, and to be admitted as a Partner of his Glory.

It were to be wish'd that every one who Publishes his Observations on the *Microcosm* of Man was endow'd with the same Reach and Compass of Understanding, and the same Perspicuity of Judgment, as these celebrated Professors of our Faculty: For the generality of Authors are only *Copiers* and *Collectors*, who are dress'd up, and look considerable in the very Plunder and Robberies they have committed, and have nothing of their own to boast of, but some frivolous Subdivision of a *Membrane* or a *Muscle*, or some pedantic Alteration of a *Term of Art*.

Thus as *Anatomy* has been handed down to us through so many succeeding Ages, and in Variety of Languages ; so by the Fondness of Authors for their own Discoveries, or to make them pass as such, the *Terms* of it are multiply'd till they are grown burthenfome, and a single *Bone* or a *Muscle* distinguish'd by a Train of Titles, and attended with all the Equipage of *Processes* and *Foramina*.

We are already so well acquainted by the help of Microscopes and Injections, with the Parts themselves, that there is little more to be discover'd in respect either to their Structure or Situation ; and if we consider what of late Years have been communicated to the World as so many Discoveries of Importance, we shall find them little else than some *Lusus Naturæ*, some Variety in the Origination and Insertion of the Parts, or some fictitious Sketches of the Imagination, and the Product of a *Technical* Exuberance.

As the Contexture of the Blood and Juices, and the different Figure of their Particles are invisible, and as we have no other Rule but our own Reasonings to guide us in explaining them ; so they will leave us generally at such Uncertainties in solving the Mechanism of our Frame, as will scarcely ever be adjusted, either, by Time, or by Experience. Human Reason assisted with all the Invention of our Fancy, and the Contrivances of Art is too narrow, too incompetent a Judge of the hidden Mysteries of our *Fabric* ; and whatsoever is indiscoverable to the Senses, will never be received

received as a *Maxim*, or pass upon the World as an indisputable Truth.

The Manner of *preparing* and *injecting* the *Viscera*, gives an Insight into the Communications of the *Capillary* Vessels; and from thence, perhaps, we may frame a better and more distinct Idea of the Functions tho' not of the Conjecture of the *Fluids*. But the Misfortune is, that those who have been Masters of the best *Injections*, instead of using and applying them as they ought, have oftentimes contented themselves with barely shewing their *Preparations* as a Curiosity, or as an Entertainment only for Conversation. As if it was of less Importance to Mankind to trace out the intricate and most minute *Mæanders* of the Body, and the Laws of *Animal* Secretion, than by keeping their *Injections* as so many *Arcana* to favour of *Empiricism*, and to obstruct the Improvements of the Faculty. Dr. *Ruysch* has given us in his *Thesaurus* several excellent and curious Drawings of the finest *Preparations* in the World; but we had certainly been more oblig'd to him, if he had communicated his Observations on the Manner of *preparing* them, and form'd from thence a noble, a just and a demonstrative *Rationale* of the Uses of the Parts, and the Morbid Alterations of our Frame. One useful Discovery is worth a thousand *Sculptures*, when applicable to the Cure of a Distemper, and the settling the Foundations of our Practice.

Those who are unacquainted with, or have not opportunity for Dissection, reap a vast Advan-

The PREFACE.

Advantage from this Art: and that it might not seem to be neglected, there are added several *Figures* in the *Appendix*, with proper Explications and Amendments. The Reader therefore in this Volume will have all the Advantages he can desire; he will have a general *System* of *Anatomy*, and a studied Treatise on it, a *Description* of the Parts, and a *Theory* deriv'd from them: What Monsieur *Bourdon*, and Dr. *Keil*, what *Malpighi* and *Verheyen*, what *Vesalius*, *Bidloo*, *du Verney*, Mr. *Cowper*, and others of the great Reformers of this Science, have delivered to us, are comprised, commented on, and frequently improved by our Author, in the most methodical Discourses, and the most elegant Delineations.

How far he was capable of performing every thing of this Nature I have already shewn; and I forbear to Preface any farther in his behalf, lest I should too widely deviate from that Fulness of good Sense, so remarkable throughout his Works, at the very time I am commending it in him, and be guilty of too much Prolixity in his Character, who abhorred it.

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A NEW
SYSTEM
OF
ANATOMY.

BOOK I.

CHAP. I.

Of the General Constituent Parts of the Body.

ANATOMY is the Art of *Dissect-* *Anatomy*
ing, or artificially taking to Pieces *what.*
the solid Parts of *Animal Bodies,* in
order to an exact Discovery of their
Structure.

It is often divided into *Speculative* and *Practi-* *Speculative*
cal, a Division which I think not very momen- *and Pra-*
tous, and therefore shall not insist upon. *tical.*

The Subject of it is a *Human Body:* And tho' *Its Subject.*
Brutes and *other Animals,* and sometimes *Vegeta-*
bles, fall under its Consideration, it is only (with *Compara-*
Physicians at least) in order to illustrate the for- *tive Ana-*
mer; and is called *Comparative Anatomy.* *tomy.*

Anatomists have usually divided the Body into *Vulgar*
Parts *Organical* and *Inorganical,* *Similar* and *Divisions*
Dissimilar, *Spermatic,* &c. But to what use, or *of the Bo-*
with how much Instruction, is not very apparent *dy.*
to me, who am apt to think such Distinctions *Useless.*
B only

only burthenfome to the Memory, and not very edifying.

*Necessary
Division.*

However, there is a Division, which is not to be neglected, which is into such Parts, as will have frequent occasion to be mentioned in the following Discourses, that are capable of a General Definition, which would not be proper so often as the mention of them will particularly recur. It will however be absolutely necessary for the Benefit of Learners (for whose sake such Treatises as this are written) that a General Idea be given of them, before they come to read of them separately.

*Enumera-
tion of the
Solid
Parts.*

The whole Body consists of *Bones, Cartilages, Ligaments, Membranes, Fibres, Muscles, Tendons, Arteries, Veins, Nerves, Glands, Lymphæducts, Laëteals*, and some other peculiar *Ducts*, which will be best known by their Descriptions in their proper Places.

*Fluids or
Humours.*

Besides these which are the *Solid* and *Continent Parts*, there are contained in them divers *Fluids*, such as the *Chyle, Blood, Milk, Fat, Serum, Lymph, Spirits, Bile, Salival, Pancreatick Juice, Seed, &c.*

*Bone defini-
ed.*

A BONE is the hardest Part of the Body, and the Prop and Support of all the rest, for which end it is fram'd. Its Substance is white, fragil, not distendible, (but in morbid Cases) and void of Sensation. The Bones are all covered with a peculiar Membrane called the *Periosteum*, which is extremely sensible; and many of them are hollow, and fill'd with an oily fat Substance, which is call'd the *Marrow*.

*Perioste-
um.*

*Marrow.
Cartilage.*

At their ends they are usually capp'd with a white, smooth Substance, somewhat softer than themselves, upon which they move and turn, and which is called a *CARTILAGE*; which in length of time often grows bony, as it is generally found in old People.

To the *Bones* are always annexed *LIGA- Ligament.*
MENTS, which are a *tough, flexile, smooth Sub-*
stance, serving to tie them together, and sometimes
resembling a *Tendinous* or *Nervous*, sometimes a
Membranous, and sometimes *Cartilaginous Sub-*
stance, into which, in some *Diseases*, they often
degenerate.

A MEMBRANE is a *thin, white, or transpa- Membrane.*
rent, flexile, expanded Substance, serving to cover
and cloath the other Parts, which is the proper
and peculiar use of it: When it is the covering
of a *Vessel*, it is called a *Coat* or *Tunic:* Those *Tunic.*
that cover the *Brain*, are by a peculiar Name
called *Meninges* or *Matres*, of which more in
their proper Place.

A FIBRE (called likewise a *Filament*) is a *Fibre.*
long slender Thread, and, like a Thread, is in the
several Parts variously wound up into a great Di-
versity of Figures. These *Fibres* (according to the
now prevailing Opinion) are all hollow, and per-
colated by some Fluid or other, which renders
them in effect all *Vessels.* There are four sorts
of them according to the vulgar Division, *Car-*
nous, Nervous, Tendinous and *Osseous*, of one or
other of which, all the other Parts consist.

A MUSCLE is a *fleshy Part consisting of Fibres, Muscle.*
and serving for Motion. It is ordinarily divided
into three Parts, which are called the *Head*, the
Belly, and the *Tail*, of which the *Head* and the
Tail are generally the *Tendons*, the *Head* being
that *Extremity* which is fixt to the Part most sta-
ble; the *Tail* to the more moveable. *Muscles*
are likewise divided into *Simple* and *Compound;* *Simple and*
the *Simple* are those which have but one *Venter Compound.*
or *Belly;* the *Compound* those which have two
or more; or otherwise, the *Simple* are those
which consist of a simple Order of *Fibres*, and
the *Compound* of *Fibres* variously disposed,

*Venter, or
Belly.*

The *Belly* of a *Muscle* is the *thick, fleshy* part, into which are inserted the *Arteries* and *Nerves*, and out of which issue the *Veins* and *Lymphæducts*.

Tendon.

A *TENDON* is the *hard white Part* of a *Muscle*, usually placed at either *Extremity* of the *Muscle*, and co-operating with it in its *Action*. The *Fibres* of this are ordinarily thought to be *Nervous*, but (in my Opinion) are only *Productions* of the same *Fibres*, which make the *Belly* of the *Muscle*, but their being more closely and firmly connected, makes the *Difference* of *Appearance*, and their *Whiteness* proceeds only from the *Blood's* being partly excluded by the tightness of their *Contexture*; so that there seems to be no other difference between them, than there is between a *Skein* of *Thread*, and a *Cord* made of the same *Thread*. In the *Limbs* one of these *Tendons* is usually fixt to an *unmoveable Point*, the other to a *moveable*: So that when the *Belly* of the *Muscle* in *Contraction* is swell'd and shortned, the *moveable Point* is drawn towards the *immoveable*, by which means *Local Motion* is performed.

Artery.

AN *ARTERY* is a *hollow Fistulous Channel*, conveying *Blood* from the *Heart* to all *Parts*. It

Its Coats.

ordinarily consists of *three Coats*, or *Membranes*: The outward, *Nervous* or *Tendinous*: The second, *Carnous* or *Muscular*: The third, *Glandulous* or *Vascular*: Through these is all the *Blood* of the *Body* conveyed towards the *Surface*. All *Arteries* begin with a *Trunk*, and growing gradually less and narrower end in *Branches* so minute, that they escape the *Sight*, unless assisted with *Microscopes*; by which, in the *Tails* of *Tadpoles*, and very small *Eels*, the *Extremities* of the *Arteries* seem by the swift uninterrupted *Course* of the *Blood*, to be continued to the *Originations* of the *Veins*, though through the *Transparency* of those *Vessels*, the actual *Continuation* be not visible.

visible. The *Coats* of them are of a very firm, close Contexture, by which means the *Blood* not being visible through them, they generally appear white. In these the *Blood* proceeding from a greater Capacity to a less, is thereby somewhat obstructed in its Passage ; but being forced on by the Motion of the *Heart*, distends the Coats of the *Arteries*, and thereby occasions that *salient Motion* which we call the Pulse.

A VEIN is another *Fistulous Channel*, for the *Vein*. Conveyance likewise of *Blood* ; but its Course is directly opposite to that of the *Arteries*. For instead of a *Trunk* distributed into *Branches*, and *Capillaries*, this is a *Trunk* formed out of the Concourse of *Capillaries*, which receive the *Blood* from the *Arteries* in the respective Parts, and re-convey it to the *Heart*. In these the *Blood* coming from narrow Channels into wider, finds less Opposition, and therefore less Force is requir'd to drive it on. But to supply that want of Protrusion, the *Veins*, (especially those of the lower Limbs) are furnished with *Valves*, which are two *Membranes* placed opposite to each other in the Cavities of the *Veins*, closing 'em against any Reflux of the *Blood*, and thereby sustaining the Weight of it in the great Trunks. The Impulse of the *Heart* being much broken in the *Capillaries*, and the *Blood* proceeding from narrow to wider Passages, the *Veins* have no Pulsation. For this reason it was not necessary that the *Coats* should be so strong and firm as those of the *Arteries*. However, they are in their Texture alike ; but those in the *Veins* being thinner than those in the *Arteries*, and the *Blood* appearing through them, makes them look blue in Dissection, and not white.

A NERVE is a round, white, long, smooth Body, like a Cord, deriving its Origin from the Brain, or Spinal Marrow, and serving (as is suppos'd) for

the conveyance of Animal Spirits. The Trunk of every Nerve is covered with a very thin proper Membrane, and consists of innumerable slender Fibres infinitely divisible, which are dispers'd through every Part of the Body, where there is either Sense or Motion.

Gland.

A GLAND is a soft, spongy, lax Body, and furnish'd with a little Excretory Duēt, or Pipe, through which it emits that Fluid for the Secretion of which it is fram'd. It is suppos'd by Modern Anatomists to be only a Convolution of the Capillary Artery, to which a Capillary Vein is join'd, which, with the Excretory Duēt, make up the Body of Glands, the Organs of Secretion. The Excretory Duēts arise from the Glands, which they help to compose. They spring from the Extremities of the Arteries and Veins, and carry off a Liquor separated from the Blood.

The Lymphatick Glands have either Lymphæducts for their Excretory Duēts, or Lacteal Vessels, as in the Mesentery.

Lymphæducts.

THE LYMPHATICKS, OR LYMPHÆDUCTS, are very small, fine, hollow Vessels, generally arising from the Glands, and conveying back to the Blood a transparent Liquor, which from the resemblance it in shew bears to Water, is called Lymph. These, though not so visible as the other Vessels, because of their Minuteness and Transparency, are however existent in all Parts of the Body: But the difficulty of finding them has hinder'd them from being described in many Parts.

Lacteal Veins.

THE LACTEALS are a peculiar sort of Lymphatick Vessels for the conveyance of Chyle, improperly called Veins, proper only to the Mesentery and Intestines, from whence they arise, and through which they run. They are not always full, at least not of Chyle: When they are, which is when the Aliment is digested, and before it is passed out of the Intestina Tenuia, they appear white, at other times

times transparent, somewhat like the rest of the *Lymphæducts*.

CHYLE is a white Juice about the consistence *Chyle.* of Milk, form'd out of the Parts of the dissolv'd Aliment, incorporated with the Potables by the *Peristaltick* Motion of the Stomach and Intestines, and thereby diluted, and render'd thin enough to enter the Mouths of the *Lacteals*, whence it is convey'd to the *Receptacle*, and thence unto the *Blood*, of which it is the first Matter and Substance. The Taste of it, as we have experienced in *Dogs*, is somewhat *brackish*, which argues it to abound more with *Salts*, than *Milk* does.

MILK is also a white Liquor, but whiter, *Milk.* thicker and sweeter than the *Chyle* itself, from which it is deriv'd, and probably without much more Artifice or Alteration, than the leaving behind some *aqueous* and *saline* Particles.

BLOOD is a mix'd red Liquor, circulating in *Blood.* the Arteries and Veins of the Body, which while it is in the Vessels appears uniform: But when let out, and cold, separates spontaneously into a red and a transparent Part, of which the first is call'd *Cruor*, and the latter *Serum*. The *Cruor* consisting *Cruor.* of Parts more *Fibrous*, is generally gather'd when *Serum.* cold into a *Coagulum*, and swims in the *Serum*, which still retains the Form of a *Liquor*.

By the *Chymical Analysis* it is found to consist *Analysis* mainly of *Phlegm*, as the *Basis* or *Vehicle*, a great *of the* Quantity of *Volatile Salts*, a good deal of *Oil*, *Blood.* and some *Earth* or *Caput Mortuum*, out of which a small Quantity of *Fixt Salt* may be extracted.

By *Microscopical* Observations, whilst circulating in the *Vessels*, it is discerned to consist of a great Number of small *red Globules*, floating in a transparent Liquor, which are supposed to be the *Cruor* and *Serum*, which are so distinct when let out. But though the Motion, which is very *rapid*, may make the *Fibres* or *Filaments* of the

*Appear-
ance thro'
the Mi-
croscope.*

Cruor appear round, and perhaps by a kind of *Whirling* or *Rotation* really convolute them, yet that their *Figure* is not *Globular*, when let out, may fairly be collected from their *Cohæſion*, or *hanging together* in a lump, which *spherical* Bodies touching one another but in a very small *Superficies* are not apt to do. But on the contrary, this Property argues an *Implication* of their *Fibres* within one another.

Lymph.

The *SERUM* is ſufficiently deſcribed in the foregoing Article: But it affords another *Liquor* little differing from it, in colour or conſiſtence, or indeed in any other diſcoverable *Quality*: Except that the *Serum* is probably charg'd with more recrementitious Parts. This *Liquor* is ſeparated from it poſſibly in all Parts of the Body for particular uſes, and is return'd again to the *Blood* by peculiar *Ducts* of its own, and is therefore dignified with a ſeparate Name, and is call'd the *Lymph*. This ſome would have to be the immediate Matter of Nutrition, which ſhall be examined in its proper Place.

*Animal
Spirits.*

*Triple Di-
viſion of
Spirits.*

SPIRITS have been antiently diſtinguiſh'd into three ſorts, *Animal*, *Vital*, and *Vegetative*: But the *Moderns* have reduced them to one ſort, viz. the *Animal*: About the Nature of which, and the Matter whence they are form'd, great Diſputes have ariſen among *Anatomists*: Though the Exiſtence of them have not yet been demonſtratively prov'd.

*Of doubt-
ful Exi-
ſtence.*

*Not defi-
nable.*

It is hard to define what could never yet be brought under the Judgment of our *Senſes*, ſo that every Man is at liberty to entertain what *Notions* he pleaſes concerning them, of which ſome have been extravagant enough. All that we ſhall offer concerning them (if they have a real Exiſtence) is that they muſt needs be extreme ſubtle Bodies, which eſcape all manner of Examination by the *Senſes*, though never ſo well aſſiſted,

assisted, and pervade the Tracts of the *Nerves*, which yet have no considerable *Cavity* or *Perforation*, nor could ever by any Experiment be collected, yet are *constantly moving* in vast Quantities, as they must of necessity be, to perform all those mighty Operations, which are ascrib'd to them. However, the Antiquity of the Opinion claims some Reverence: By their help we are supplied with a vast number of *precarious Solutions* of great *Phænomena*; and without them we must leave a great *Chasm* in the *Philosophical History* of *Animal Bodies*. They are supposed to be separated in the *Brain* from the *subtlest* parts of *Blood*, and from thence to be carryed by the *Nerves* to all the parts of the Body, for the performance of all *Animal* and *Vital Functions*. But of what peculiar Nature they are, we leave those to wrangle about, who are better satisfied of their Existence.

*Of great
Antiquity
in Notion.*

BILE is a *yellow, bitter Juice*, separated from *Bile*. the *Blood* in the *Liver*, and from thence discharg'd by the common Duct into the *Duodenum*. It is of *two* sorts, one thinner, more mild, and more inclin'd to a greenish Colour than the other, and is separated from the Glands of the *Liver* immediately into the *Porus Biliaris*. The other which is separated from the Glands of the *Liver* likewise into the *Gall Bladder*, by *Roots* or *Ducts* proper to itself, is of a *brighter yellow*, of a *greater* consistence, and more *Bitter* and *Acrimonious*.

*Of two
sorts.*

The *Bile* by *Chymical Analysis* affords some *Sulphur* or *Oil*, some *Volatile Salt*, and a good deal of *Fixt Salt* (in which particular it differs considerably from all other *Animal Liquors*) and a pretty quantity of *Caput Mortuum* or *Earth*, and in this as all the rest, the *Basis* is *Phlegm*.

Analysis.

The *SALIVAL* and *PANCREATICK Juices* resemble one another so nearly in their Quantities and Appearance, that we need not separate them

*Salival
and Pan-
creatick
Juices.*

Analysis. them in their Descriptions. They are *transparent* Liquors, consisting chiefly of *Phlegm*, mixt with a *Volatile Salt*, and nothing else discoverable. The first separated by the Glands about the *Mouth* and *Fauces*: The latter by the *Pancreas*, which discharges itself into the *Duodenum*.

Seed. The SEED is separated in the Testicles, and contained in proper *Vesicles*, and is when well constituted a *white Liquor*, thicker than any other in the Body, consisting almost entirely of *Oil* and *Volatile Salts*, which are blended together by the *Mediation* of a little *Phlegm*. Its Activity seems mainly to be deriv'd from the *Volatile Salts*, with which it abounds far beyond any other

Analysis. *Animal Liquor*.

Animal-cules in the Seed. The Use of the *Microscope* has discover'd (as some fancy) floating in it several *Wormlike Bodies*, which move up and down as if they were alive, and have by Mr. *Lewenhoeck*, the first Discoverer of them, and divers others after him, been maintain'd to be real *Animals*, each of them a true *Fætus*, a little *Man*, whose shape likewise some pretend to discover by their *Glasses*: Of which Opinion we shall discourse more at large in the proper Place.

Mucus Urethræ. The *Genital* Parts afford likewise another *Liquor* which is *viscous* and *transparent*, and serves only to *line* and *lubricate* the Parts, that the *Seed* may slip the more freely without adhering. This comes from Glands lately discovered by Mr. *Cowper* about the *Penis*, and is that which in Women is commonly mistaken for the *Semen*.

The *Mucus* of the *Joints*, is a *Mucilaginous Liquor*, separated by its proper *Glands*, conveniently placed in the *Interstices* of the *Bones*; where these Glands are gently prest by the Motion of the Parts. It serves to make the *Extremities* of the *Bones* or *Joints* slip easily.

The *Mucus* of the *Nostrils* is separated by its proper Glands, placed in the internal *Membrane* of those Parts, which shall be spoken of in its proper place. As shall, *Mucus Narium.*

The *Ear-Wax*, which has also its proper Glands to separate it from the Blood, placed in the outward Passages of the Ears. *Cerumen Aurium.*

There are divers other *Excrementitious Humours*, such as the *Urine*, the *Sweat*, &c. which need no Description, and shall be spoken of with the Parts to which they belong.

C H A P. II.

Of the Cuticle or Scarf-Skin.

THE Cuticle is a thin pellucid Membrane, void of Sense, and serving as a cover for the Skin. *Cuticle.*

Though it lies first expos'd to view, yet because of its close coherence to the Skin, it is very rarely discern'd from the Skin itself, but by *Anatomists*, who generally separate it by an *actual Caustery*, by which it appears to be a very thin and simple Membrane, which expos'd to the *Microscope* (as some pretend) appears to consist of Scales. *Adherence to the Skin. Tenuity. Squamulae.*

But if instead of raising it by an *actual Caustery* on a dead Body, we examine that which is rais'd by *Cantharides*, or any other *Vesicatory*, we shall find it to consist of several Membranes exceedingly thin and fine, and not altogether destitute of Bodies resembling Glands, which in that state become visible to the naked Eye. *Lamellae. Glandulae.*

It is extended over the whole Body, and being it self insensible, serves to defend the subjacent Skin which is extremely sensible. It is full of innumerable *Foramina* or Perforations, as well for the Hairs, as for the Sweat, and Effluvia of the Body. *Pores of the Cuticle.*

Body, which pass by *insensible* Perspiration, yet not so full but that it obstructs that excessive discharge of serous Humours, which otherwise would be evacuated by the *Glands* of the *Skin*, as appears plainly by the great Quantities discharged by *Blisters*, or any other Accident, whereby the *Skin* is denudated.

Origin.

Some would have it to be form'd from the grosser part of the *excrementitious serous Humours* eliminated through the Pores of the *Skin*, and condens'd upon the Surface, like the *Pellicle* which appears upon Evaporation on the Surface of the *Serum* of the *Blood*.

They that please themselves with this Fancy, are at liberty to enjoy it; because it is not a Point worth controverting. But *Monf. Lewenboeck* with more probability thinks it to be an Expansion only of the Excretory Ducts of the *Glands* of the *Skin*.

It has no proper Vessels, at least none that have been discover'd by Anatomists: Yet having had the Curiosity to examine several times the *Cuticle* rais'd by *Vesication*, I have always found in it *Glands*, or Bodies like *Glands*, which were in that state pretty conspicuous, and pretty numerous, from whence it seems to me certain, that there are Vessels, though not discoverable by the Eye, nor perhaps in *dead* Bodies by the *Microscope*; because of the Coincidence and Flaccidity consequent of Death, which may easily cause Vessels so exceedingly minute to disappear.

I could wish therefore that they who are furnished with good *Microscopes*, would examine the *Cuticle* taken off by *Vesication*, which I am persuaded would discover something yet unobserved.

C H A P. III.

Of the Skin.

IMmediately under the *Scarf-skin* or *Cuticle* Cutis or Skin. lies a **RETICULAR** Body of *Vessels* peculiar to that part, containing a mucous Liquor, Reticular Vessels. from the Tincture of which, the Sagacious *Malpighius* imagines the colour of the Skin to be deriv'd: Which Conjecture he draws from his Observation, that the *Skin* as well as *Cuticle* of *Blacks* is white, and that they differ in no other Circumstance from those of *Europeans*, but in this particular.

The **SKIN** itself is in several Animals of a Structure. Texture very various, as appears by the different sorts of Leather made of Skins. That of *Hogs* and *Animals*, which have a *Membrana Adiposa* spread immediately under the Skin, approaches nearest the Human, which upon the score of the vast Multitude of *Sudatory Pores* (far exceeding in number those of Creatures cloathed with Hair) is more loose and spongy. It consists of Fibres of its own, or according to *Steno* is formed out of the Productions of the *Tendons* of the subjacent Parts, and furnished with an infinite Number of **PYRAMIDAL PAPILLÆ**, which are most conspicuous in the Skin of the *Soles* of the Feet, Papillæ Pyramidales. and of the *Palms* of the *Hands*, and are interwoven with innumerable *Nervous Fibres*, which render it extremely sensible; and thro' those it becomes the immediate and proper *Organ* of the Sense of *Feeling*.

Among these likewise lie a vast Multitude Glandulæ of *Glands*, which are called the **MILIARY** Miliariæ **GLANDS**, and are each of them serv'd with a Branch of an *Artery*, *Vein*, and *Nerve*, as also a proper *Excretory Ducts*, through which the matter

matter of *Sweat* and *insensible Transpiration* is secreted, and sent forth at the Perforations of the *Cuticle*.

Lines. It is mark'd externally with a great number of *LINES*, which intersecting one another at acute Angles, make generally a *Rhomboidal* Figure, though in some places they are turned *Spirally*, as at the ends of the *Fingers*: And in some likewise they are cut deeper, and are more apparent, as in the *Palms* of the *Hands*, and at the *Flexures*, of the *Elbow* and *Hams*, and *Soles* of the *Feet*.

Pores of two kinds. It is perforated every where with *PORES*, which are by *Anatomists* observed to be of two kinds, *greater* and *less*. Through the former of these the *HAIR* germinates, which is implanted with a kind of *Bulbous Root* into the *Papillæ* before-mentioned, as are likewise the *FEATHERS* in *Fowls*.

Thickness. The *Skin* is by ordinary computation estimated to be about six times as thick as the *Cuticle*: But on the *Head* and *Back*, and under the *Heel* it is much thicker: In the *Palms* of the *Hands* and the *Sides*, on the *Face* and *Forehead*, and especially on the *Lips*, it is much thinner.

On the *Face*, *Penis* and *Scrotum* it is softer than elsewhere, and on the *Neck*, *Back* and *Soles* of the *Feet* it is harder. But in different *Subjects* and *Climates* there is in respect of all these things a great Variety and Uncertainty.

Connection. It is generally connected to the subjacent Parts by the *Membrana Adiposa*, and its proper *Vessels*, *Arteries*, *Veins*, *Nerves* and *Lymphæducts*, as well where there is no subjacent *Fat*, as where the *Muscles* under it, as at the *Lips*, *Eyebrows*, and *Anus*, send *Fibres* into it.

In some places it adheres so very loosely, that it is easily separated, as about the *Belly*, *Legs* and *Arms*: Tho' in these along the *Linea Alba* it is more firmly connected, and on the *Soles* of the *Feet*,
and

and *Palms* of the *Hands*, so as not to be separated without difficulty. On the *Forehead* it grows to the *Flesh*, and almost all over the *Face*, especially about the *Ears* and *Lips*, where the *Tendons* of the *Muscles* end in it.

The use of it is to wrap up, and cover the *Use*. whole *Body*, and to be a sort of a general *Emunctory*, and a proper *Organ* of *Feeling*.

Both the *Cuticula* and *Cutis* are liable to several *Diseases*. *Accidents* or *Morbid Alterations*, of which those of the *Cuticula* are most of them of little *Moment*, and scarce worth minding, but for the deformity which they bring along with them, such as *Morphew*, *Freckles*, *Sun-burn*, &c. which *Of the Cu-* are ordinarily cured with *Cosmeticks*, with which *ticle*. the *Ladies*, who are most studious of their *Beauty*, are generally not unfurnish'd.

The *LEPROSY* only, both for its obstinacy *Of the* in resisting all manner of *Medicines*, as well as *Skin*. for its loathsomeness, and sometimes fatal *Consequences*, may demand the *Consideration* of a *Physician*, and properly enough in this place: For, though the *Root* and *Cause* may justly be *Leprosy*. thought to lie elsewhere, yet the visible *seat* of it is the *Cuticula*, and *Surface* of the *Skin*.

This *Distemper* arises from the same *Cause*, *Cause*. that most other *Diseases* of the *Cuticula*, and *Cutis* do, but in a more exalted *Degree*; for all of them proceed from thin *Salt Humours* thrown off from the *Blood*, and arrested by the *Density* of the *Cuticula*, not affording them so free a *Passage* as the quantity of them requires. This *Disease* is much more frequent in hot *Countries*, than with us, where the *Heat* of the *Sun* rarifying extremely the *Humours* of the *Body*, and subtilizing the *Blood*, causes and requires a more liberal *Perspiration*, in the course of which, the *Salts* (in their own *Nature* volatile) are still more volatiliz'd, and thereby rendered more *Acrimonious*.

These

*Lepa
Græco-
rum.*

These *Salts* being by the Appointment of Nature to be eliminated through the Pores of the *Skin*, along with the recrementitious *Serum* their proper Vehicle, are in hot Countries conveyed in greater plenty to the surface of the Body, by reason of the extraordinary Rarity of the Pores from the heat of the *Climate*, than in these *Northern* Regions they ordinarily are, and sticking in their Passage in the thin dry Membrane of the *Cuticle*, the aqueous Parts, which are their Vehicle, slip away from them by insensible Evaporation, and leave them there to corrode and fret it, till at length, through the Quantity so gather'd, the Membrane becomes dry, brittle, and white, which is the true and sole Cause of the *Desquamation*, or falling away in white Scales, which *whiteness* as well as the *brittleness* proceeds merely from the Quantity of these *Salts*, which are themselves white; and when the Moisture is drawn from them, being aculeated, and having insinuated themselves into the Pores of the *Cuticle*, dissolve the Continuity of it by their Points and Edges, which so dried and broken, is apt upon the least Attrition to fall off as in the manner above-mentioned.

Arabum.

There is another kind of this Distemper, which is called *LEPRA ARABUM*, (as the former is *GRÆCORUM*) from the frequency of it in those Countries, which, though different in appearance, carrying a dry Scabby Crust, seems to me however to differ only in degree. For, as in the former Case the *Salts* being left destitute of their Humidity, which was their Vehicle, are not so active, and therefore affect only the *Cuticle*, to which they are immediately contiguous, or perhaps the Surface of the Skin, which is sometimes made rough and uneven by them; in the latter Case, these *Salts* with their Vehicle crowding faster than they can be evaporated through the Pores

Pores of the Skin (being still in *Fluore*, and so more *Caustick*) corrode deeper, and eat not only the *Cuticle*, but the *Excretory Vessels*, and Surface of the *Skin* itself, which thereby spues out a Liqueur somewhat thicker than usual, which when the thinnest and most aqueous Parts are evaporated, is condensed into that *Crust* or *Scab* which is the *Pathognomonick* of this Disease.

I have chosen to be more particular upon this Disease, because it is the most exquisite of all the *Cutaneous* Distempers, which seem to differ from it in nothing, but the Extent of their Seat, and the Strength and Continuance of their Causes.

Thus the SMALL Pox, not having its Foundation in any permanent habitual Indisposition, either of the Climate, or Body, has its Period within a limited time, sufficient to extrude the *Peccant Matter* through the Pores of the *Skin*. For in this Disease the *Salt Serum* of the Blood being by an accidental *Fever* (arising from other Causes, than the constant Habit of the Body, or Disposition of the Climate) thrown in great Quantities upon the *Glands* of the *Skin*, acts much after the same manner with the corrosive Matter in the *Lepra Arabum*; that is, it frets the *Cuticle*, and Surface of the *Skin*, much as the other does: But when the Blood is fully despumated, and no fresh extraordinary Supply is sent to these Parts, the *Scabs* dry, and fall off, and the *Skin* recovers its former State, except that the *Eschars* of these Ulcers, which were then raised, generally remain visible ever after. Yet sometimes the Matter not being very corrosive, nor very plentiful, the Impressions it leaves are so light, that the *New Cuticle*, that supervenes afterwards, is sufficient to obliterate them. Thus the Cause ceasing, the Effect does so likewise.

If therefore any Body should call the *Small-Pox* a temporary critical *Lepra*, coming upon an

Most In-
veterate
of all Cu-
taneous
Diseases.

The Small-
Pox.

extraordinary occasion, I see no reason to impugn his Notion: And though the Treatment be, and ought to be different, it is because more Respect is had to the Internal accidental Cause, than to the External Symptoms, and their Effects upon the Skin.

Why but once.

Why the *Small-Pox* seldom visits any Person more than once in his Life-time, has been a famous *Problem* much agitated with very little Success; and therefore, if I succeed in my Attempt to resolve it no better than others have done before me, I shall not think it any Loss of Reputation, but shall freely wish others more happy in theirs, when they undertake to reform my Notion.

Alteration in the Skin the Cause.

I conceive therefore that the Alteration made in the Skin by the *Small-Pox*, at whatever Age it comes, is the true Reason why that Distemper never comes again. For the Distention, which the *Glands* and Pores of the Skin suffer at that time, is so great, that they scarce ever recover their *Tone* again, so as to be able any more to arrest the Matter in its Course outwards long enough, or in such Quantity, as to create those *Ulcerous Pustules* which are the very *Diagnosticks* of the *Small-Pox*. For though the same *Feverish* Disposition should, and may again arise in the Blood, yet, the Passages through the Skin being more free and open, the Matter will never be stopt so there, as to make that Appearance, from whence we denominate the *Small Pox*.

Features why permanently enlarg'd by the Small-Pox.

Accordingly we generally observe, that in those Persons, who have been severely handled by the *Small-Pox*; the *Face* (which is generally the fullest from the Obstruction which the Matter meets with upon the account of the greater Constipation of the Pores of the *Cuticle*, by reason of its being constantly exposed to the Air) seldom returns to its former Dimensions. This Enlargement I think is to be accounted for, from

from the Dilatation of the *Areolæ* of the *Glands*, and Pores of the *Skin*, and not from any Augmentation of the Substance itself.

I am farther confirmed in this Opinion from the Observation, that Nurses and others, that attend closely upon Persons sick of the *Small-Pox*, are frequently so far affected with the Distemper, as to feel some very light Disorder, and, with or without that Warning, to have two or three Eruptions. That it comes to no more I attribute to the free Course which the Matter has thro' the Pores of the *Skin*. With this also agrees the constant Observation, that People of coarse-grain'd *Skins*, in whom the Pores are largest, are most favourably treated by this Distemper, which likewise constantly leaves fine *Skins* much coarser than it found them.

What has been said of the *Small-Pox*, will *Measles*, suffice to solve the *Phænomena* of the *Measles*, *Scarlet Fever*, and *Erysipelatous Inflammations*, *Scarlet Fever, &c.* which differ only in Degree or Occasion.

This Course and Effect of these *Salt Serous Humours* are likewise applicable to the *Itch*, and other *cutaneous* Eruptions, which we not designing a formal Treaty of here, leave others to apply as they see Occasion, which it will be easy for them to do.

C H A P. IV.

Of the MEMBRANA ADIPOSA, and its FAT,
and of the CARNOSA seu Musculosa.

IMmediately under the Skin lies the FAT, *Fat.* which is called in *Latin* *Pinguedo*, and in *English* by the general Name of *Fat*, in Contradistinction to the *Adeps*, *Sevum* or *Suet* and *Leaf*, which are found in the Cavities of the

Abdomen, and differ somewhat from each other in Consistence.

*Where
found.*

This *Fat* is found all over the Body co-extended to the Skin itself, except on the *Forehead*, the *Eyelids*, *Penis*, and *Scrotum*. In emaciated Bodies, instead of this *Fat*, we find a Sort of flaccid transparent Membrane, which is nothing else but the *Loculi* or *Cellulæ Adiposæ*, in which the *Fat* of Bodies in good Habit is contained, but which in these is wasted.

What it is.

It is in Substance a gross whitish Oil, and is indeed nothing but the Oily Part of the *Aliment*, separated from the *Arterial* Blood by the *Adipose Glands*, and carry'd by peculiar *Ducts* to the *Membranous Cells*, from whence it is transmitted to the Blood again by the *Veins*.

Its Use.

The *Fat* of both Kinds serves as a natural Balsam to preserve the Body, and by mixing with, and enveloping the *Salts*, wherewith the *Blood* and *Serum* are highly saturated, keep them from fretting and corroding the Parts of the Body, through which they pass. It is thought likewise, not without great Probability, to make a considerable Part of the Nourishment of our Bodies; and accordingly we find that the grossest, fattest Persons, falling into an *Atrophy*, do in Process of Time lose all their *Fat*: Which is always quite expended in such Cases before the Disease becomes fatal.

*Incommo-
dities of
too much
Fat.*

As it has its great and excellent Uses, so it is not without its Inconveniences likewise. For, corpulent Persons that abound with it, having their Blood too much charged, and all their Organs too much clogged with it, *Sensation* is damp'd, and they are apt to fall into a *Drowsie Lethargick* Condition, which sometimes ends in sudden Death. But the Abundance of it seldom fails of being attended with *Inactivity* and *Somnolency*, not only from the Unwieldiness of an

over-

over-grown Body, nor from the stuffing of the Cavities of the *Thorax* and *Abdomen* alone, which is sometimes so great as to obstruct in some Measure the Motion and Expansion of the *Diaphragm* and *Lungs*, and so to produce a *Dyspnæa* or Difficulty of Breathing, and sometimes an *Orthopnæa*, which arises from the Pressure of the over-charged *Viscera* of the *Abdomen* upon the *Diaphragm*: But it is probable likewise that the Quantity of *Fat* or *Oily* Particles being returned into the Blood, and engaging and implicating the more subtle active Parts, hinder those Secretions from being made in the *Brain* in that Quantity, which is necessary to a vigorous Animal Action.

The MEMBRANA ADIPOSA, if there be *Membr-* really any such *Membrane*, and that it be not ra- *na Adipo-* ther the exterior Membrane of the *Carnosa* or *sa.* *Musculorum communis*, which most Anatomists now agree it to be, is supposed to be the *Basis* of the *Fat*, to which the Cells wherein it is contained are fix'd.

Next under the *Fat* lies the PANNICULUS *Pannicu-* CARNOSUS, which consists of a double Mem- *lus Carno-* brane, the upper of which makes the *Membrana* *sus.* *Adiposa* before spoken of. The under, which is likewise call'd MEMBRANA MUSCULORUM COMMUNIS or MUSCULOSA, is in some Places interwoven with pretty thick *Muscular* Fibres, which are supposed to contract and corrugate the *Skin*: Tho' this Action of it is visible no where in a human Body, except on the Forehead, or in some the whole Scalp. It is spread all over the Body, but very unequally in point of Thickness, and has its *Arteries*, *Veins*, and *Nerves*, from those of the subjacent Parts.

The particular Use of it is to support, and be, as it were, a Basis to the Globules of *Fat*. It serves in general as all other Membranes do, to

wrap, defend and connect the Parts together. Its different Names taken either from the Structure, or the Site, have occasioned some to multiply it, tho' thro' Mistake only.

C H A P. V.

Of the Muscles of the Abdomen.

NEXT after the *Membrana Musculosa* appear the MUSCLES of the *Abdomen*, of which there are five Pair.

*Obliquus
Descen-
dens.*

Of these the *outermost* are the OBLIQUE DESCENDING Pair, so call'd from the oblique Course of the Fibres, which run from their Rise above, slanting downwards toward the fore Part.

This is a very broad Muscle, covering each entirely one side of the *Abdomen*, and some Part of the *Thorax*. It arises from the two last true Ribs, and five spurious ones, and is indented with the *Serratus Major Anticus*, by five or six Digitations, each of which receives a Nerve from the Interstices of the Rib. It springs likewise from the Margin of the *Ilium*; and ends in a broad Tendon in the

*Linea
Alba.*

LINEA ALBA, which is a white Line, that runs from the *Cartilago ensiformis* to the *Os pubis*, dividing the *Abdomen* exactly in the Middle, and is formed out of the Tendons of the *Oblique* and *Transverse* Muscles.

*Obliquus
Ascen-
dens.*

The next Pair is the OBLIQUE ASCENDENS, which lies under the lower Part of the former, running with a Course just contrary from the lower Part upwards.

Its fleshy Fibres have their Origination from the Edge of the *Os Ilium*, and end at the *Costæ Nothæ*: It terminates with a large double Tendon in the *Linea Alba*, the upper Part of which
ramping

ramping over the *Musculus rectus*, and the other creeping under it, and joining together at the *Linea Alba*, do as it were sheath the *Musculus rectus*. Tho' sometimes towards the bottom of the Muscle this Duplication is not so visible, but begins about the Navel, and so proceeds upwards.

These Muscles, as likewise the *Transverse*, are perforated in Men near the *Os pubis*, for the Passage of the *Spermatick Vessels*, and in Women for the *Ligamenta Uteri rotunda*. Thro' the lower of these Perforations in a Rupture or Dilatation of the *Peritonæum* part of the Intestines sometimes slip, and make that Tumour which is call'd a *Bubonocoele* or Inguinal Rupture.

The next is the *MUSCULUS RECTUS*, so call'd, because its Fibres run streight along the Belly, from the *Sternum* and *Cartilages* of the *Ribs* to the *Os pubis*. *Rectus.*

The Belly or *Venter* of this Muscle is distinguish'd by three, sometimes four tendinous Lines or Inscriptions, according to the number of which some have reckon'd it so many several Muscles: Others, as a Muscle of so many Bellies. They have been apt likewise to dispute which was the *Head*, and which the *Tail* of this Muscle, which being a dry Speculation of no great use, I shall not trouble the Reader with any other Decision, than that he may reckon either of them indifferently, *Head* or *Tail*.

After these comes the *PYRAMIDALIS*, which being but a small Muscle, tho' it lies upon the lower part of the *Rectus*, is usually taken notice of after it; because till the *Rectus* is rais'd, it is not so distinctly apparent. *Pyramidalis.*

It has its Name from its Figure, and its Origin from the superior and inferior Margin of the *Os pubis*, with a pretty broad fleshy Head, from whence it rises, and grows gradually narrow till

it ends in a small, almost round Tendon, in the *Linea Alba*, sometimes almost at the Navel.

Sometimes
single,
sometimes
wanting.

This is sometimes a single Muscle, and in some Subjects not found at all: But where it is solitary, it is generally found (as some Authors say) on the left Side.

Transver-
salis.

The last is the TRANSVERSE, so call'd from the Course of its Fibres broad-ways cross the *Abdomen*. It is the lowest in Situation, and lies immediately upon the *Peritonæum*, which it sticks close to. It arises from the Transverse Processes of the *Vertebræ Lumbares*, from the lower Rib and interior Margin of the *Os Ilium*, and is inserted with a broad Tendon like a Membrane into the *Linea Alba*.

Arteries
and Veins.

All these Muscles receive Branches of *Arteries* and *Veins* in the upper Part from the *Mammaries*, which exert themselves about the *Cartilago Xiphoides*, and below from the *Epigastricks*, on each Side from the *Intercostals* and *Lumbals*.

Under those Muscles, but more particularly under the *Recti*, run the principal Branches of the *Mammary Arteries* and *Veins*, which latter have been observed to have very numerous Inosculation with the *Epigastrick Veins*, of which *Veerheyen* tells us, that he observ'd some hundreds in a Dog. Under the *Transverse* and *Oblique* run the *Intercostals* and *Lumbals* in most Plenty, tho' 'tis probable all of them are served by each, unless perhaps the *Pyramidals*.

Nerves.

They have their *Nerves* from the *Intercostals* and *Lumbals*, which usually bear the Blood Vessels Company.

Use.

These *Muscles* serve not only as a Wall and Defence to the *Viscera*, contained in the *Abdomen*; but likewise by their Contraction to streighten the Cavity of the *Abdomen*, and by that means to promote the Descent of their Contents thro' the *Intestines*, and to force it into the *Lacteals*,

teals, and to serve as Antagonists to the *Sphincter*, *Ani* and *Vesicæ*, and forcibly expel the Excrements of those Parts, and likewise of the *Fœtus* in Parturition. They are also instrumental towards *Expiration*, by drawing down the Ribs, and upon this account are to be look'd upon as assistant Antagonists to the *Intercostals*, and other Muscles that promote *Inspiration*. They are likewise the chief, if not only, Organs or Instruments of *Vomition*, which Action is vulgarly, tho' falsely, imputed to the Stomach, of which more largely hereafter.

C H A P. VI.

Of the Peritonæum.

THE Muscles of the *Abdomen* remov'd, the PERITONÆUM displays itself, which is *Peritonæum.*
a thin, soft, smooth Membrane, covering and containing all the Viscera of the lower Belly.

Its Figure in the natural State answers that *Figure.*
 of the lower Belly, and makes a kind of irregular Oval.

It is every where double, but more plainly so *Duplicity.*
 from the *Navel* to the *Os Pubis*: Where likewise in Women it is thicker for the conveniency of Distention in the time of Gestation.

Its *External* Surface is somewhat rough and fibrous from its Connexion with the Muscles: But *External Surface.*
 the *Internal* is exactly smooth, and lin'd with an unctuous Humour (to facilitate the sliding of the *Intestines* along it) which is separated by a Number of small Glands, which in Hydropical Bodies grow larger and more visible, as the Membranes themselves do likewise thicker. *Glands.*

It is connected on the outside to the *Transverse* Muscles of the *Abdomen*, and *Linea Alba*,
 below

Ligamentum Suspensorium Hepatis.

below to the *Os Pubis* and *Ischium*, on the side to the *Os Ilii*, behind to the *Os Sacrum* and *Vertebræ Lumbares*, especially the first and third. From which it is said by many to have its Origin, and where likewise the Duplicature is again very visible, not only upon the account of its remarkable thickness, but from its spontaneous parting to receive the *Kidnies* betwixt the *Laminae*. It is also reflected from the inferior Surface of the *Diaphragm* to the Superior, or Convex Surface of the *Liver*, which it suspends, and this part of it is called *Ligamentum Suspensorium Hepatis*.

Processus Externi.

Involucrum Ligamentum rotundi Uteri.

The Exterior Coat has two Processes, in Men, falling down into the *Scrotum*, and wrapping up the *Spermatick Vessels*, where they are likewise dilated, and make the *Tunica Vaginalis* of the *Testes*. In Women they form an *Involucrum* for the *Round Ligament* of the Womb. Ignorant Surgeons, not knowing precisely where these Processes pass the Perforations of the *Obliqui Descendentes*, sometimes mistake Ruptures for Tumours of another kind, and attempt Suppurations, that might be fatal, if prosecuted: And sometimes *Vice Versa*, put Trusses upon Apostemations, that ought to be open'd.

Arteries and Veins.

It receives *Arteries* and *Veins* in the upper part from the *Mammariæ* and *Diaphragmaticæ*: In the lower from the *Epigastricæ* and *Sacræ*: And on each side from the *Lumbares*.

Nerves.

The Nerves come out of the *Os Sacrum*, and the Loins.

Lymphaticks.

Olaus Rudbeck pretends to have discovered *Lymphaticks* in it, which are seldom mention'd by Authors, because seldom visible, but in Hydropical Cases, and therefore not often seen. In Morbid Cases great quantities of *Serum* have often been found between the Duplicatures of this Membrane, when there has been none beneath it

it in the Cavity of the *Abdomen*. This is the true *Tympany*, and is frequent in Women, whose *Ovaria* are probably in such Cases first affected, at least they are then scarce ever unaffected, tho' all other Parts be sound.

The Use appears to be Simple, to contain and Use.

keep in their Place the *Viscera* of the *Abdomen*, which is so manifest, that, whenever the *Peritonæum* happens to be broken, or extraordinarily dilated, some of them are very apt to fall out of their Place, and to form those Sorts of Tumours, which are call'd from the Parts displaced *Enterocèle* and *Epiplocèle* : And those are

again divided according to the Parts they fall upon, as a Rupture of the *Guts* falling upon the *Navel* is call'd *Omphalocèle*, which is an Accident that happens frequently to Children, sometimes to Women upon hard Labours ; and is often seen in Dogs, who from the Horizontal Position of their Bodies have a greater Weight, and bearing of the *Intestines* upon that Part than any other of their Body. The next is the *Bubonocèle*, which is the falling down of the In-

*Several
Kinds of
Ruptures.*

testines thro' the Perforation of the *Musculus*

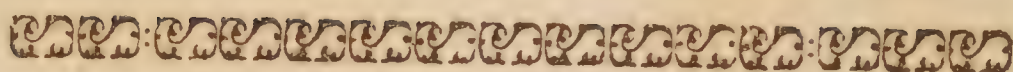
*Bubono-
cèle.*

Obliquus Descendens. In the *Scrotum* such a Descent of the *Intestines*, or *Omentum* being the most usual Kind of Rupture, it is called *Enterocèle*, or *Epiplocèle*, or from both together *Enteropiplocèle*.

*Enterocèle.
Epiplocèle.
Enteropiplocèle.*

All these Sorts of Ruptures are occasioned by Blows, violent Concussions, over-stretching in Vomiting, hard Labour, or Wind, from which latter Cause it is that Ruptures are so frequent in Children, and so easily help'd by timely Care.

There are other Tumours, which from their outward Appearance are also call'd *Ruptures* vulgarly. But these, relating to the *Common* and *Proper Teguments* of the *Testes*, shall be spoken of elsewhere.



C H A P. VII.

A View of the Viscera of the Abdomen in their Natural Situation, &c.

THE *Peritonæum* removed gives us the View of the Parts in their Natural Situation, as they lie disposed one among another.

Funiculus Umbilicalis.

Of what consisting.

Omentum.

Intestines.

Ventriculus or Stomach.

Lien Spleen.

The first, that appears, is the **FUNICULUS UMBILICALIS**, of which Care must be taken, that it be not cut in dividing the *Linea Alba*, which it perforates. It consists of three Sorts of Vessels, a *Vein*, two *Arteries*, and the *Urachus*, which soon after the Birth dry up, and become *Ligaments*.

The next to be consider'd is the **OMENTUM**, which is spread almost all over the *Intestines*, and covers the superior Part of the *Abdomen*.

The *Omentum* taken away, the **INTESTINES** are discovered variously contorted, and connected almost thro' their whole length to the *Mesentery*: The *Thick* ones lying uppermost, and the *Thin* underneath, and together filling the greatest Part of the *Umbilical*, and *Hypogastrick Regions*.

In the *Left Hypochondrium* immediately under the *Diaphragm* lies the **STOMACH**, which if it be empty, and the *Thorax* unopened, is scarce seen, unless it be forcibly elevated, and brought forwards.

On the Left Side of the *Stomach* lies the **SPLEEN**, which, unless bigger than ordinary, is quite hid by the *Stomach* and *Diaphragm*, and impending Parts of the *Thorax*, and therefore must be drawn a little out of its *Natural Site* to be plainly seen, before the *Thorax* is opened.

The

The LIVER is a very *bulky Viscus*: But, be-
 cause the *Diaphragm* in dead *Bodies* is very much
 Concave towards the *Abdomen*, even this too is
 almost hid by the *Diaphragm* and *Cartilages* of
 the *spurious Ribs*: So that it is hard to shew its
 Posture likewise, till the *Thorax* be opened.
 Therefore to display the contain'd Parts of this
 Region, either the *Thorax* with the *Diaphragm*
 must be forcibly lifted up, or the *Lungs* so
 strongly inflated that the *Stomach* and *Liver*
 may be driven downwards. By the first way you
 see them as in violent *Expiration*; and by the
 latter as in the Act of ordinary *Inspiration*.

The KIDNIES and VESICA URINARIA re-
 quire somewhat more Help to make them dis-
 cover themselves. On each Side in the *Loins* lie
 the *Kidnies*, entirely hid, and cover'd by the
 ambient Parts, which must be removed by the
 Hand before they can be come at.

Lower yet in the *Pelvis* of the *Abdomen*,
 partly under the *Os Pubis* lies the BLADDER
 of URINE, which likewise needs some Help,
 though not so much as the *Kidnies*, to have a
 Sight of it.

The confused Order, wherein divers of these
 Parts seemingly lie perplexed and intermixed
 with one another, has occasioned many Mistakes
 concerning the Seat of Internal Abdominal
 Pains, in some of which a great deal of Judg-
 ment is required to distinguish nicely: As be-
 tween *Hypochondriacal*, *Colical*, *Nephritical* and
Lumbal Pains. So likewise *Inflations* of the *In-*
testines, particularly of the *Colon*, often impose
 upon *Physicians* for indurated *Spleens* and *Scir-*
rhous Livers, only by seeming to point by some
 extraordinary *Intumescence* and *Hardness* at the
 Regions where those *Viscera* lie.

Hepar
Liver.

Renes or
Kidnies.

Vesica
Urinaria
or Blad-
der of
Urine.

Confused
Site of the
Viscera
occasions
frequent
Errors in
the Diag-
nosis of
Distem-
pers.
Pains in
this Regi-
on hard to
be exactly
discrimi-
nated.

T A B. I.

F I G. I.

PArt of the *Cuticula* raised from the *true Skin*, as it appears by a magnifying Glass after it has lain ten Days in common Water.

A, The *Inferior* or *Internal* Surface of the *Cuticula* next the *Cutis*.

B, The *exterior* Surface of the *Cutis* next the *Cuticula*.

a a, The *Hairs*, which are

common to the whole Body, and were raised with the *Cuticula*.

b b, Their *Bulbous* Roots, as they appear'd when drawn out of the *Foramina*, that received them in the *Cutis*.

c c, The *Foramina*, or Holes of the *Skin*, whence the Roots of the Hairs were extracted.

F I G. II.

THe *Abdomen* open'd to shew its *Viscera* in their Natural Situation. In this Subject the *Skin* and *Fat* were taken off the upper Part of the Body and Arms, to shew their external Muscles: The Right Arm lying in that Action call'd *Pronation*; the Left in *Supination*.

A A, The *Internal* Surface of the *Skin* covered with the *Fat*.

B B, the *Internal* Surface of the *Peritonæum*, as it appears when the Muscles with it are divided cross-ways at the Navel, and their four Corners turn'd out to shew the Parts contain'd.

a, The Navel cut out, and left to shew the *Ligaments* in Adults call'd,

b, The *Urachus*.

c c, The two *Umbilical Arteries* turn'd down.

C, The *Vena Umbilicalis* also chang'd to a Ligament,

here turn'd up, where Part of the *Ligamentum suspensorium Hepatis* may be also seen ↓.

D, Part of the *Convex* Surface of the *Liver in situ*.

E, Part of the *Stomach* also seen in this Position.

F F F, The *Omentum* as it usually appears lying on the Guts. Here its Blood Vessels may be seen that pass from the Stomach to it, call'd the *Arteria* and *Vena Gastrica Epiploica dextra* and *sinistra*.

G, Some of the *small Guts* not cover'd by the *Omentum*, as they lie on the Beginning of the *Colon* in the right *Ilium*.

d, Part of the *Musculus Cremaster*, as it descends on the Process of the *Peritonæum*, that incloses the *Spermatick* Vessels in their Progress to the *Testes*.

e, The

e, The *Blader* of *Urine*, distended with *Wind* to make it appear in this Position.

f, *Os Pubis*.

g, The *Ensiform Cartilage*,

H H, The two *Pectoral Muscles in situ*.

h, *Os Pectoris* or *Sternum*.

I, *Musculus Quadratus Colli* or *Platusma Myoides* covering,

i, The *Mastoideas*,

k, The *Masseter*, and

l, The *Parotid Gland*.

K, Part of the *Clavicula*.

p, Part of the *Musculus Elevator Scapulæ*, and

q, A portion of the *Cucullaris*, covered by the *Quadratus Colli*, also

m, The *Musculus Zygomaticus*, and

n, The *Temporalis*.

o, *Os Jugale*, and *Musculus Orbicularis Palpebrarum*.

L, *Musculus Deltoides*.

M, *Gemellus*.

N, *Brachæus internus*,

O O, Parts of the *Serratus Major Anticus*, by which may be seen (in the Shade) a

portion of the *Latissimus Dorsi*.

P, The *Biceps* in both Arms.

Q Q, *Radialis extensor Carpi*.

R, *Supinator Radii Longus* in both Arms.

S, The *Extenders* of the Thumb.

T, *Extensor Digitorum Communis*.

V, *Extensor Minimi Digiti*.

W, *Anconæus*.

X, *Ulnaris Extensor*.

Y, Part of the *Ulnaris Flexor Carpi*.

Z, *Abductor Minimi Digiti*.

r, The *Interossei*, as they appear on the Back of the Hand.

s, The *Flexor Carpi Radialis* in the Left Arm.

t, Part of the Tendon of the *Palmaris longus*.

u, *Abductor Pollicis*.

w, The Tendon of the *Flexor Pollicis longus*.

x, The Tendons of the *Musculi Flexores Digitorum Perforans* and *Perforatus*.

C H A P. VIII.

Of the Omentum, or Caul.

THE OMENTUM, EPIPLOON, *Rete* or *Re-Omentum* (for by all these Names it is variously call'd by Authors) is a membranous thin Part, connected at its upper Extremity chiefly to the bottom of the *Stomach*, to the concave part of the *Liver*, to the backside of the *Duodenum*, to that part of the *Colon*, that lies under the

the *Stomach*, to the *Back*, and to the *Spleen*. It is spread immediately over the *Intestines*, having its other *Extremity* loose.

Duplica-
ture, or
Leaves.
*Vasa Adi-
posa.*

Areolæ.

It consists of *Two* Membranes or Leaves betwixt, and on the Surface of which innumerable *Veins*, *Arteries*, *Nerves*, and *VASA ADIPOSA*, or *Fat* Vessels, running variously cross, and intersecting one another, divide it into a Multitude of little *AREOLÆ*, resembling the *Mashes* of a fine *Net*. The *Fat* in its proper Ducts running along with the other Vessels, and together with them, renders those Divisions of the *Areolæ* obscure, while the intermediate Spaces are filled with a transparent Membrane, full of small Holes, so that the whole in shew seems to be a beautiful kind of *Net*.

Cavity.

These Leaves form a considerable *Cavity* like a large Purse or Sachel, into which, if a Blow-pipe be thrust below the *Stomach*, it may be blown up to the Capacity of a Gallon. Its Bottom is fasten'd to the small Guts. Tho' these Membranes be of a Texture too rare to retain the Flatus long, yet the Experiment suffices to shew the Continuation of the Trunks of the Blood Vessels from the *Stomach*, *Duodenum*, *Colon*, and *Vas Breve* into it. Some have made this *Succulus* the Seat of divers Distempers, but I think without sufficient Ground, except in Dropsies, and therefore shall not take Notice of them here.

In several Subjects it is of an unequal Extent, in some not reaching beyond the Navel, in others being large enough upon a Rupture of the *Peritonæum* to fall down into the *Scrotum*. *Hippocrates* lays it down as one of the Occasions of Sterility in Women, when being too fat, it lies too heavy upon, and compresses the *Os Uteri*. Perhaps this Conjecture of his is founded upon his Observation, that *Barren* Women are apt to grow

grow *Fat*, and that those which are *Prolifick*, usually grow *Fat* when they have done Bearing, and so may ascribe their ceasing to Bear, to their growing *Fat*; whereas I should rather impute their growing *Fat*, to their *ceasing* to Bear.

The ordinary *Weight* of it is about half a *Weight*, Pound; tho' sometimes it has been observed very thick and hard, and in *Hydropical* People to amount to several Pounds *Weight*.

Its *Arteries* come from the *Cæliac* and *Mesenteric*, and the *Veins* run to the *Porta*, especially the *Splenic* Branch of it, and are call'd *Epiploicæ*, and some, which are common to the *Stomach* as well as the *Omentum*, are call'd *Gastro-epiploicæ*. Its *Nerves* come from the *Intercostals*, and are not large. *Extent Vessels.*

The *Fat* here, as in the *Membrana Adiposa*, is either separated into the *LOCULI* or *ADIPOSE CELLS*, and from thence deliver'd into the *Ductus Adiposi*: Or else is brought by them to these *Adipose Cells*. For the extreme *Fineness* and *Transparency* of these *Vessels*, as well as of their *Liquor*, renders it exceeding difficult to trace their *Origin* or *Course*: And indeed it remains something doubtful, whether they be hollow and real *Ducts* or not, or whether they be only *Fibres*, such as are observed in the *Spleen*, along which the liquid *Fat* does as it were drill its *Way*, as the easiest it can find. *Doubt concerning the Ductus Adiposi.*

The accurate *Malpighius*, the first nice Observer of this Part, and Discoverer of these *Ducts*, (if such they are) inclines to the former Opinion: And indeed it is hard to entertain any other. All that is certain concerning them, is, that they discharge themselves, or terminate in little oily Globules of *Fat*; concerning the farther Use and Progress of which, much remains still to be discovered. *Opinion of Malpighius concerning 'em.*

Other
Doubts of
Malpi-
ghius.

Concern-
ing their
Origin.

Concern-
ing their
Propaga-
tion thro'
the Body.

Concern-
ing the
Source of
their Fat.

Deserving
a farther
Enquiry.

MALPIGHIUS himself starts several ingenious Doubts, which he recommends to farther Prosecution: *First*, Whether these *Adipose Ducts* be not propagated from the Fibres which abound in the *Spleen*, or those Fibres from them: One of which he is induced to suspect from the Similitude of these Fibres to those which he finds in the *Omentum*, and from the Communication and Continuation of some Fibres, which he observes between them, whereas those of the *Spleen* seem to have none with the *Blood Vessels*.

His other Doubt is, whether there may not yet be any undiscover'd Communication between the *Omentum* and the *Membrana Adiposa*: And whether by means of its Connexion with the Back, its Vessels may not be propagated into every Region of the Body by the Mediation of this Membrane, which is spread over it, and so be as it were the common Root of the *Fat* all over the Body.

Neither is he more certain yet, whence this *Omentum* is supply'd; for besides the *Spleen* before mentioned, *Malpighius* offers to our Consideration two other Fountains, viz. the *Stomach*, and the *Glands* of the Body. The first he suspects upon the account of the Connexion of the *Omentum* with it, and the latter upon Observation, that they are generally accompany'd with *Fat*, and from the Taste of them, which he thinks they are beholden to the *Fat* for.

But, as he does, so do I think this Matter deserves a farther Enquiry; for I cannot think any of those the real Source of it, and must content my self with deriving it from the Blood in general, without assigning the immediate Organs of its Separation.

As *Anatomists* are hitherto deficient in assigning the true Source of the *Fat*, so are they likewise in my Opinion about the Uses of it.

The

The first and principal Use of the *Fat* in general is to implicate and curb the Acrimony of the Salts of the Blood, which otherwise would be apt to fret and corrode the Parts thro' which it passes, especially those which are Membranous and Vesicular, and accordingly in *Lean* Persons we observe, that they are more liable to *Catarrhs*, and other Distempers arising from Acrimonious *Serum*. It serves likewise to Anoint and Lubricate the several Parts, and to make them move commodiously ; and is likewise suspected by many to serve as Nutriment to the Body, which Opinion is supported by the common Observation, that *Fat* Persons grow *Lean* by long Abstinence, and that some Animals, which in the Summer-Season feed plentifully, and grow *Fat*, will at the Approach of Winter withdraw and hide themselves, and live all that Season without Food, and appear again in the warm Weather *Lean* and shrunk ; which is an Argument that the *Fat*, which they gather in the Summer-Season, serves 'em for Nutriment in the Winter. This Opinion is countenanced by other Observations, that most of those Animals retire very *Fat*, especially the *Tortoise*, which has peculiar Vessels containing an extraordinary Stock of *Fat* along the *Intestines*, which probably serves for his Winter's Sustenance. This Use supposes a Return of it into the Blood, which is very probable, tho' the particular Way of its Passage is not yet discovered.

Uses of the Fat.
Retunding the Acrimony of the Salts.

Suppling and Lubrication.

Nutrishtment.

I am of Opinion likewise, that it serves as a sort of a *Natural Balsam* to preserve the other Parts from Corruption. For as all Oily Bodies are more particularly exempted from Putrefaction than others, so in an Animal Body all the other Parts are subject to speedy Putrefaction, the *Fat* only well separated from the rest, will keep without putrefying. It may perhaps be objected, that after Death corpulent Bodies purge most,

Serves as a Natural Balsam to preserve the Body.

and putrefy soonest : But that does not arise from the Quantity of *Fat*, but from the abundance of mixt Humours, which are apt to ferment and putrefy, and of which emaciated Bodies are almost destitute, and therefore not liable so soon to putrefy.

*Use of the
Omentum.*

The particular *Use* of the *Omentum*, with regard to its Situation, is to assist the *Peristaltick* Motion of the *Intestines* by lubricating them with its *Oily* Substance, which transudes thro' its Pores, and by following them in their Doublings and Windings, and thereby serving them as a soft Bolster to slide upon, and, by their filling up the Hollows, preventing their being too much distended with *Flatulencies*, yet giving Way to 'em when repleted with Aliment. It may have some farther Effect by cherishing the *Intestines* with its Warmth ; but that, tho' it has been fancy'd to be its primary Use, cannot be much, because it is not naturally warmer than the *Intestines* themselves, and their Comfort of that Kind must be mutual.

C H A P. IX.

Of the Oesophagus.

*Why
treated of
here.*

TH O' the OESOPHAGUS properly belongs to another *Venter* of the Body, yet being the Channel thro' which every thing we take is convey'd to the Stomach, and being of a Substance so nearly resembling to it, that they seem to be but a Continuation or Expansion of each other : I thought fit to premit the Account of it to that of the *Stomach*, that the Action of the latter might be consider'd entire.

Oesophagus.

The OESOPHAGUS, GULA, or GULLET, is a *Membranous Pipe* descending from the Mouth to
the

the STOMACH, between the *Aspera Arteria* and the *Vertebræ* of the Neck and Back in a straight Line, except a little Deflexion about the fifth *Vertebra* of the *Thorax*, where it turns somewhat towards the Right, to make way for the great *Artery*, which runs along with it to the ninth, where turning again towards the last, it crosses over the *Artery*, and piercing the *Diaphragm*, ends at the Left Orifice of the *Stomach*.

It consists of several Coats or Membranes, *Its Coats.* which are vulgarly reckon'd by *Anatomists* to be but three: Tho' some number four, and others five or six, allowing the *Crusta Villofa* to be one, which last Division, as the most nice, we shall follow. The first is membranous, and design'd only for a Covering to the rest, like the *Membrana Musculorum Propria*, which it resembles, *Exterior Membrana.* and seems only a Continuation of the outward Membrane of the *Stomach* deriv'd from the *Peritonæum*: Tho' some *Anatomists* derive this of the *Oesophagus* from the *Pleura*, others from the *Diaphragm*, &c. a Controversy of no great Importance, and scarce worth the Decision.

The second Coat is MUSCULAR, consisting of strong fleshy Fibres, like other Muscles, so that it seems to make the *Gula* a hollow fistulous Muscle. According to *Steno* and *Willis* it consists of two Orders of Fibres, going from Top to Bottom in *Spiral Lines*, contrary to, and decussating each other. *Tunica Musculosa, seu Musculus Vaginalis.*

This Description is very exact of the Gullet of *Ruminants*, but not so of that of Men: And it is probable, those two great Men before-mentioned fell into this Error by examining the *Oesophagus* of Brutes only, and thence concluding too hastily that the Structure was the same in *Humane*.

In Men this Coat consists of two fleshy *Lamellæ*, like two distinct Muscles. The outward *Fibræ rectæ.*

being composed of STREIGHT LONGITUDINAL FIBRES, which in the Descent of the *Oesophagus* growing narrower, (not far from the *Pharynx*) approach one another nearer, and are implanted into the Parts underneath.

*Annular-
res.*

The *Inner Order of Fibres* is ANNULAR without any observable Angles, tho' it is easy by drawing it either upwards or downwards to make them appear Angular, with the Angles pointed towards the Force, which may have imposed upon some; but when under no Violence they appear perfectly round.

*Their
Action.*

The Use of this Coat and these Orders of Fibres is to promote *Deglutition*, of which the *Longitudinal*, when in Contraction, shorten the *Oesophagus*, and so make its Capacity larger to admit of the Matter to be swallow'd. The *Annular*, on the contrary, in their Action, contract the Capacity, and closing behind the descending Aliment, press it downwards. So that these two Orders of Fibres seem to be Antagonist Muscles to one another, yet by different Actions both conspire to the same End, the *Protrusion* of the *Aliment*.

Illustration

*Tumours
of the
Gala.*

This Action of these Fibres is farther evinced and illustrated by those *Oedematous* or *Schirrous* Tumours, which sometimes happen on this Part, which render *Deglutition* difficult, especially of *Fluids*. For *Solids*, being capable of the Impression of these Fibres, and the assistant Muscles, are, tho' with Difficulty, forced thro' the obstructed Part in Bulk and Quantity as they descend thither: But *Fluids*, not having Resistance enough to force the Tumour, are apt upon Compression to return upon the *Fauces*, and cannot pass but in a *Fillet* or *Thread* answerable to the Space left open by the Tumour, and therefore are a long Time in passing.

On the contrary in a *Paralysis*, when the *Paralysis*.
Tone of the Fibres is resolved, yet the Bore of
the Gullet not obstructed, Fluids pass with equal
Ease, as if the Part were not disaffected. But
Solids, wanting the Force of the Muscles and
Fibres, cannot be got down.

The next Coat, which is called the VASCU- *Tunica*
LAR, consists of a double Membrane. The out- *Vasculosa*.
ward form'd of irregular Fibres, and innumer-
able Vessels, interwoven, from whence it is called
the *Vascular*.

The INNER TUNIC consists of streight Lon- *Glandulo-*
gitudinal Fibres somewhat fleshy, mixt with a- *sa*.
bundance of little Glands, from whence it has
been esteem'd a distinct Coat, and is called the
Glandulous. This Membrane adheres firmly to
that within it, which is call'd

The NERVOUS Coat, and is extremely fine, *Nervea*.
made up of excessive slender Fibres variously dis-
posed. This Coat is continued to that which
covers the *Fauces*, *Mouth* and *Lips*, whence it
comes, that tickling the Bottom of the *Fauces*
by vellicating this Membrane, provokes a Reach-
ing to Vomit. This Membrane is the Instrument
of Sensation, in this Part, and as some think the
Seat of *Thirst*, or the Organ whereby the Appe-
tite of *Drink* is produced.

This Coat is lined inwardly with a villous *Villosa*.
Crust which is not reckon'd among the *Tunics*,
which I look upon to be the Excretory Ducts of
the Glands, and, not unlike the *Cuticula* to the *Cu-*
tis, to serve to defend the subjacent Membrane.

In case of Excoriations by sharp Humours it *Rejected*
has sometimes been brought up at the Mouth, *sometimes*
when the upper Orifice of the Stomach has been *by the*
closed by Tumours, which Case seems to differ *Mouth*.
only in the Circumstances of the Part affected,
and the Way of Evacuation from the like Excre-
tions in *Dysenteries*.

This Membrane so cast up, does not ill resemble the *Cuticula*, as it appears when raised by Vefication ; and perhaps there is as near a Resemblance between the Nature of their Causes as to the Kind and Degree of Acrimony, both proceeding from Volatile Animal Salts, tho' one be External and Artificially procured, the other Internal and Spontaneous, or Fortuitous.

Pharynx. The upper Opening of the *Oesophagus* situated at the Bottom of the *Fauces* is call'd PHARYNX. This being the Place where the Action of Deglutition commences, and where it is mainly performed, it is assisted by or rather composed of three Pair of Muscles.

Par Stylopharyngæum.

The first which is call'd STYLOPHARYNGÆUM arises round and fleshy from the *Processus Styloides*, and in its oblique Descent becomes thicker, and afterwards is expanded on the back Parts of the *Fauces*, between the double Series of Fibres of the following Muscles.

These, when they act, draw up and dilate the *Pharynx*.

Par Pterygopharyngæum.

The PTERYGOPHARYNGÆUM arises from the *Processus Pterygoides*, where the Tendon of the *Musculus Pterygostaphilinus* is reflected. Some fleshy Fibres of it spring likewise from the upper Jaw-Bone behind the farthest Grinder, and some from the Sides of the Tongue, and *Os Hyoides*. From all these Places its fleshy Fibres pass semi-circularly, and meet with those of the opposite Side in a middle Line on the back Part of the *Pharynx* externally. In the Internal Surface of the *Fauces* is another Order of fleshy Fibres that decussate the former at acute Angles. These rise not only from the Sides of the *Uvula*, but also from the Root of the Cartilage excavated for the *Meatus à palato ad aurem*, and descend obliquely, to their Insertions in the Glandulous Membrane of the *Pharynx*, as far as the *Cartilago Thyroides*.

This

This Muscle serves not only to constringe the *Pharynx*, but likewise to compress the *Tonsils* and force out their *Mucus*, upon which score it is likewise employ'd in promoting *Hawking*.

Valsalva, who has lately given us a new Account of the Muscles of these Parts, denies the Existence of this part of the Muscle, which springs from the *Processus Pterygoïdes*, which, however, is constantly and regularly found. The same Author has likewise of two other parts of this Muscle, long since describ'd and figur'd by Mr. *Cowper*, made two distinct Muscles, and given them two new Names. The part springing from the Tongue he calls *Glossopharyngæus*, and the other part immediately below it *Hyopharyngæus*. *These multiplied by Valsalva.*

The various Originations of the several Parts of this Muscle have caus'd it to be generally divided into several Muscles; whence come the *Cephalopharyngæus* and *Sphænopharyngæus*, which, as those of *Valsalva* before-mentioned, are only parts of various Origination, which concur in forming this Muscle. *And by many others before him upon the Score of their various Origination.*

The OESOPHAGÆUS, which is generally accounted a *circular* Muscle, is strictly no more than a Production of the foregoing Muscle, whose Fibres surrounding the *Pharynx*, form a *Tendinous* Line on the back part of it, but it being connected on each side to the *Cartilago Thyroides*, has been thought to arise from thence, and is by *Veerheyen* taken for a pair of Muscles conspiring to form a sort of *Sphincter* by their Concurrence. But in these things *Anatomists* are so little agreed, and they are differences of so small Importance, that it is not worth detaining the Reader to reconcile them. *Cephalopharyngæus. Sphænopharyngæus. Oesophagæus seu Sphincter Gulæ.*

It closes the *Gula*, and helps to thrust down the Aliment when enter'd. In which Action it is assisted by the *Musculous* Coat of the *Gula*, which *Use.*

*Vaginalis
Gulæ.*

which is by some reckon'd among the proper Muscles, and call'd *Musculus Vaginalis Gulæ*; but is already describ'd here among the Coats.

C H A P. X.

Of the Stomach.

Stomach.

Situation.

Tab. I.
Fig. II.
Figure.

Cardia.

Pylorus.

*Circular
Fibres, or
Sphincter
of the Py-
lorus.*

*Antrum
Pylori.*

TO the end of the *Oesophagus* is fasten'd the STOMACH, which lies immediately under the *Diaphragm*; and is partly cover'd on the right side by the *Liver*; having on its left the *Spleen*. It is in Figure somewhat like a Bagpipe, and has two Orifices. The Left or Superior appended to the *Oesophagus*, seems in reality to be no more than a Continuation or Expansion of it: It is in Greek call'd *καρδια*; The Right or Inferior Orifice is continued to the *Duodenum*, and is called *πυλωρὸς*. This Orifice is narrower than the other, and extended to the *Duodenum* by an oblique Ascent; which Structure, (quite contrary to the other which enters the *Stomach* almost perpendicularly with a greater Capacity, that the Aliment may come easily in) is given to it to hinder the Aliment from passing too precipitately out of the *Stomach*, before it be sufficiently dissolved. For this reason likewise it is furnished with an extraordinary Series of Fibres, which constrict and contract it more than any other part of the *Stomach*; and running round it, serve as a kind of *Sphincter*, which is open'd by the Contraction of the *Stomach*, and by the appulse of the Chyle.

At the bottom of the *Pylorus* is a large Cavity, which *Willis* calls the *Antrum*, and assigns to it the Office of keeping the first digested Chyle, till that which was later taken into the *Stomach* be digested. But if it be true, as Dr. *Wharton*

observes,

observes, that there are *Venæ Lactææ* in the bottom of the *Stomach*, such a Provision seems unnecessary, and the most fluid Part of the Chyle has then another Passage; but the Existence of these is disputed.

The *Stomach* is largest on the left side, and grows straiter and straiter, as it proceeds towards the *Pylorus*.

Its *Magnitude* is various, and less generally in Women than in Men; though in these likewise it varies very much, and is largest in those that are accusom'd to eat and drink liberally. *Magnitude.*

The *Coats* of the *Stomach* are generally reckon'd but three; the inner of which is cover'd with a Mucous Spongy Lining like very fine Hair, as in the *Oesophagus*, call'd the *Crusta Villosa*, and is, in my Opinion, as that is, nothing but the *Excretory Ducts* of the *Glands*. *Coats.*

The *Exterior* is that common one which is deriv'd from the *Peritonæum*. This Coat is every where very thin about the Orifices, and at the bottom it is much thicker, and furnish'd with Fibres somewhat like *Muscular*, and as if they serv'd for Motion. *Exterior Coat or Membrane.*

The *Second or MUSCULAR Coat* consists of thick fleshy Fibres, of two Orders *Inward* and *Outward*, and are so dispos'd as to intersect each other on all parts of the *Stomach* at right Angles. The *Inward* run obliquely towards the left upon the upper Part of the *Ventricle*; but on the under Part they reflect towards the right. *Second or Muscular Coats. Two Orders of Fibres.*

In this outward Order or *Lamina* upon the upper Part of the *Stomach*, is a remarkable Parcel, or *Fasciculus*, of Fibres, which pass from the left Orifice *Longitudinally*, and terminate in the right, entering the *Antrum* of the *Pylorus*. *Fasciculus of Longitudinal Fibres.*

The Office of this Coat is to constrict the *Stomach*, and drives its Contents towards the *Pylorus*, as likewise by the joint Action of its *Use of this Coat.*
Fibres

Peristaltick Motion.

Fibres of both Orders, to make the *PERISTALTICK* or *Vermicular* Motion, which begins at the left Orifice of the Stomach, and is continued thro' the whole Tract of the Intestines, as may be seen in all live Dissections. In this Motion the *Longitudinal* Fibres seem to have the least share; and rather serve as Antagonists to the rest: In their Contraction by approximating the two Orifices of the *Stomach*, they hinder the too hasty Expulsion of the Contents.

Use of the Longitudinal Fibres.

Nervous Coat.

The *Third* Coat is *Nervous*, and consists of Fibres variously interwoven with numerous Blood-Vessels and Glands.

Its Use.

This Tunick serves for *Sense*, and by the Pricking of some Humours upon this Coat, *Appetite*, or the *Sense* of *Hunger*, is suppos'd by most Authors to be rais'd; the Ground of which Opinion shall be examin'd hereafter. Its Glands likewise may contribute something towards that Quantity of Mucous Humour which is found in the *Stomach*.

Crusta Villosa.

The *CRUSTA VILLOSA* is by some Authors reckon'd a fourth *Tunic*, and perhaps not unjustly. On the Inner Surface of this, are to be seen innumerable *Villi* or fine *Fibrillæ*, rising perpendicularly every where out of it, which some will have to serve for nothing but a Defensative to the *Stomach*, to preserve it from acrimonious Humours. But I think them to be the *Excretory Ducts* to the subjacent *Glands*, which many Authors would have to be (that now exploded thing call'd) a *Parenchyma*, but which are indeed the Organs, by which most of that Humour, which is discharg'd upon the Stomach, is separated, and these *Villi* the immediate Channels through which it is convey'd.

Its Use.

Inner Surface, or Plicæ of the Stomach.

The Inner Surface of the Stomach, when it is not distended by the Contents, is full of *Wrinkles* and *Folds*, made by the *Nervous Coat* and

Crusta

Crusta Villofa, which, being co-extended to the *Muscular Coat* in its utmost Distention, and not Contractile, as that is, must, when that is in its Contraction, lie thus folded and wrinkled. But in hard Drinkers, and in Stomachs usually distended with Flatulencies, the Tone of the Muscular Coat being destroy'd, the Inner ones lie plain, and even with it. *Hard drinking or Flatulencies destroy the Tone.*

By the means of these *Plicæ*, the *Nervous Coat*, which is not contractile, but yet extremely sensible, is preserv'd from being painfully stretch'd, when the *Stomach* is distended: Some will likewise have them to serve to be a stop or check to the sliding of the *Aliments* too soon out of the *Stomach*; but this seems not a genuine use of it, because when the *Stomach* is at its full Distention, which should be the necessary time of checking, the Surface is then more plain, and when the *Stomach* is quite empty, and there can be none of that use, the Corrugations are then greatest. *Use of the Plicæ. Not to stop the hasty Course of the Aliment.*

Dr. *Glisson* and *Willis*, and after them most *Anatomists*, have thought, they served likewise, and that principally too, to stop and keep a reserve, a stock of old *Chyle*, which they thought by the stay in the *Stomach*, to be exalted into a kind of *Ferment*, which served not only to stimulate the Coats of the *Stomach*, and to excite Appetite, but also as a *Menstruum* to ferment and dissolve the future Aliment. To this Opinion I have spoken more largely in a distinct Treatise, and therefore shall dismiss it in this place. *Nor to keep a Reserve of Stale Chyle for a Ferment.*

The *Vessels* of the *Stomach* are very numerous. Its *Arteries* come from the Branches of the *Cæliack* both Right and Left, and are call'd the *Gastricks*. Its *Veins* go to the *Porta*, some immediately into the *Trunk*, and some into the *Splenick Branch*. The first are call'd the *Right* *Vessels*.

Coronary
Vein.

Vas Breve.

Right Gastricks, and the other the *Left*. To these comes another large *Vein*, which runs along the whole length, and with its *Roots* embraces almost the whole *Ventricle* whence it springs, and is therefore call'd the *Coronary*. It sends off likewise some *Branches* which join with the *Splenick Branch* at the *Spleen*, which are by *Anatomists* call'd the *Vas Breve*; but should more properly be call'd *Vassa Brevia*, because of their Number. Through those *Vessels* the *Ancients* thought that a *Melancholick Humour* was convey'd from the *Spleen* to the *Stomach*, which served to vellicate the *Membranes* of it, and to excite *Appetite*. But this *Fancy* is refuted by the *Discovery* of the *Circulation* of the *Blood*, which has demonstrated that nothing comes through those vessels from the *Spleen* to the *Stomach*; but that on the contrary, *Blood* is convey'd from the *Stomach* into the *Splenick Vein*, and by that to the *Vena Porta*.

Nerves.

Its *NERVES* are considerable both for Number and Magnitude, and come from the *Trunks* of the *Par Vagum*, which descending along the *Oesophagus*, are divided into two *Branches*, *Interior* and *Exterior*, of which the *Interior* joining again together from one *Trunk*, which falls down along the *Oesophagus*, to the outside of the left *Orifice* of the *Stomach*, and from thence spreads itself all over the bottom of the *Stomach*. The *Exterior Branches* likewise joining a little lower, descend to the inner side of the same *Orifice*, and from thence diffuse themselves over all the upper part of the *Stomach*. It receives likewise some *Branches* from the *Plexus* form'd in the *Abdomen* near the *Stomach*, by the *Branches* of the same *Nerve*, which is call'd the *Plexus Cardiacus*.

The External Surface of it is plentifully cover'd with *Lymphaticks*, which discharge themselves into the *Receptacle of Chyle*. *Lymphaticks.*

C H A P. XI.

Of the Intestines.

THE INTESTINES, which seem to be nothing but a Continuation of the *Stomach*, consisting of the same Number of Coats, fabricated in the same manner, are protended with various Circumvolutions and Inflexions to the *Anus*, thro' which they discharge the excrementitious part of their Contents out of the Body. *Intestines.* *Coats.*

They are, when separated from the *Mesentery*, to which they are all along connected, of a very great length, ordinarily about six times as long as the Persons whose they were. And though they seem to be but one continued Channel or *Fistula*: Yet because in several Parts their Magnitude, Figure, and Thickness are different; they are in general divided into the *Thick* and *Thin*: And these again are each of them subdivided into three; the three *Thin* are called *Duodenum*, *Jejunum* and *Ileum*: And the *Thick*, *Cæcum*, *Colon*, and *Rectum*. *Connexion* *Division into Tenuia and Crassa.* *Number.*

They have all of them in common a kind of *Vermicular Motion*, which, beginning at the *Stomach*, is propagated downwards, and is call'd the *PERISTALTICK Motion*. To facilitate that, they are generally lubricated with a great deal of *Fat*, especially the *Thick Ones*, whose Surface being somewhat more uneven, and the Contents less fluid than those of the *Thin*, they need somewhat more to make them slide easy. *Peristaltick Motion.*

The first of the *Thin Guts* is call'd *DUODENUM*, and reaches from the right Orifice of the *Stomach*, *Duodenum.*

Stomach, as far as the *Vertebræ* of the Back on the left side, where, at the first Angle made by *Its Length.* the *Intestines*, it ends, which is about twelve Inches : From which Measure it seems to have taken its Name. This Measure however is very far from being very exact, as being much too largely computed.

Orifices of the Ductus Communis, and Pancreaticus. Jejunum. Into this Gut, the *Gall Duct*, and *Pancreatick Duct* empty themselves ; and their several Liquors mix with the *Chyle*.

The next Intestine is the JEJUNUM, so call'd because it is generally found more empty than the rest ; which may be occasion'd partly by the Fluidity of the *Chyle*, which is greater in this Intestine, than in any of those that follow it. And partly by its Capacity, being somewhat larger than that of the *Duodenum*, and therefore it gives a freer Passage, and perhaps also the Irritation of this Gut thro' the Acrimony of the *Bile*, which is discharg'd upon the *Intestines* a little before the beginning of this Gut, may contribute something towards accelerating the Passage of the Contents. However it may seem sufficient to some, that thro' the great Number of *Lacteals*, with which this Gut abounds more than any other, the Descent of the Contents, here stript of the most fluid Parts, should in the rest be more sluggish, by reason of their greater Consistence.

Its Length. This *Intestine* is allow'd to possess almost the whole *Umbilical* Region, and its Length is generally computed to be about twelve or thirteen Hands breadth.

Ileum. The ILEUM, which is the third Intestine, is situated below the *Navel*, and fills the *Ilia* with its numerous Folds and Convolutions. It is the

Its Length. longest of all the *Intestines*, being esteem'd to be one and twenty Hands long : But these Estimates are somewhat arbitrary, because it is not exactly settled

par: 48.

Fig: II.

Tab: I.

Fig: I. Ab



settled among *Anatomists*, where the *Jejunum* ends, or the *Ileum* begins; neither is it easy or necessary to do it. In both this and the preceding *Intestine*, the *Inner Tunic* is much corrugated, the loose Folds of which have been thought to do in some Measure the Office of Valves, and have therefore by Authors been call'd *Valvulae Conniventes*, which are fram'd as in the *Stomach*, only by the Inner Coat being larger than the Outward.

Next to this follow the *Thick Intestines*, the first of which is call'd the *Cæcum*, which has a lateral Infertion into the upper end of the *Colon*, and is not perforated at its other Extremity, but hangs to it like the Finger of a Glove, and is about three or four Inches long.

The true use of this part is not yet determin'd; and some late *Anatomists* have thought that the Name likewise is mistaken, not allowing this to be the *Cæcum* of the Ancients, which they imagin'd to be that thick globous part of the *Colon*, which is immediately appended to the *Ileum*, and therefore they have given this part the Name of *Appendicula Vermiformis*. But this is a Controversy not worth deciding, and therefore I shall pass it over.

This *Cæcum* or *Appendix* is proportionably bigger in Infants than Adults; and in many other Animals, even smaller than in Men, and is at the unperforated Extremity slightly connected to the Right *Kidney*.

The next of the *Thick Intestines* is the *Colon*, which is much the largest, and most capacious of them all. It begins with the *Cæcum*, and is with that connected to the Right *Kidney*, thence with a winding course it proceeds towards the *Liver*, where it is sometimes ty'd to the *Gall-Bladder*, and by that ting'd with yellow. From the *Liver* it runs a-cross under the bottom of

the *Stomach*, where it is by very fine thin Membranes fasten'd to the *Spleen*, and marches over the *Left Kidney*, where its Cavity is sometimes very much streightned,, and descending so to the bottom of the *Os Ileum*, and from thence returning to the upper part of the *Os Sacrum*, and there making the Figure of a Circumflex, it ends in the *Rectum*.

Valve.

At the entrance of the *Ileum* into this Gut is placed a *Valve*, form'd out of the Production of the inward Coat of the *Ileum*, which, like the Finger of a Glove, when its Extremity is cut off, hangs loose in the Cavity of the *Colon*, by which means it stops the return of the Excrements, tho' sometimes, as in Inversions of the *Peristaltick Motion*, it proves not sufficient for that Use. It has a great many *Cellulæ*, or as it were distinct Cavities fram'd by a Coarctation of the Gut by two *Ligaments*, or Bundles of membranous fleshy Fibres, about half a Finger broad, each running on each side the Gut opposite to each other, the whole length of it, and as it were girding it in at certain distances, thereby making it resemble a Glass *Incorporator*, used now a-days to mix Oil and Vinegar.

Ligaments.

Rectum.

Connexion.

The next and last of the *Intestines* is the *Rectum*, which reaches from the *Os Sacrum* to the *Anus*, and is plain without Cells. It is fast ty'd to the *Ossa Sacrum* and *Coccygis* by means of the *Peritonæum*, and in Men to the Neck of the *Bladder of Urine*, in Women to the *Vagina Uteri*, to which it is strongly connected by a membranous Substance. That Substance of the *Vagina* and *Intestine* are hardly distinguishable from one another.

Length.

The *Length* of this Gut is ordinarily about a hand's breadth and an half, and its Capacity about the thickness of three Fingers: Its lower end, the *Anus*, is furnish'd with three Muscles.

The

The first of these is a *Circular Muscle* serving to shut the *Anus*, and keep the Excrements from coming away involuntarily, and is call'd the *SPHINCTER ANI*. It is near two Inches broad, *Sphincter* and hangs down below the *Intestine* itself near an *Ani*. Inch. It is fastned on the Sides to the Bones of the *Coxendix*, and behind to the *Os Sacrum*: Before in Men to the *Musculus Accelerator Urinæ*; in Women to the *Vagina Uteri*. Some would make this two Muscles, and some three; but that Distinction seems not very instructive; and perhaps not well grounded, and therefore as such I shall lay it aside.

The other two Muscles are call'd the *Levato- Levatores* *res Ani*, and have their rise on each side, from *Ani*. the inner lateral part of the *Ischium*, and end in the *Sphincter* before described. These serve to retract or pull back the *Sphincter* after the Expulsion of the Excrements; which, especially after hard Stools, is apt to be too far protruded, and to need the Assistance of these Muscles to reduce it. Mr. Cowper, in his *Myot. Reform. Cap. V.* says, That in their Progress to the *Anus*, they on both sides pass close over the *Prostatæ*, which they compress in *Coitu*, as they also do the *Vesiculæ Seminales*, and oblige those Parts to void their Contents into the *Urethra*, in which Action the *Diaphragm* and *Abdominal Muscles* co-operate.

There are farther to be consider'd in the *In- Glands of* *testines* a great number of GLANDS, which in *the Inte-* the *Intestina Tenuia* are gather'd together in *stines,* *Conglome-* heaps, as it were like bunches of Grapes. In *rate in the* these Intestines they are very small, and were it *small* not for their Coacervations, scarce remarkable. *Guts.* But in the *Intestina Crassa* they are much larger, *Larger,* not gather'd like the others, but dispers'd; and *but Soli-* though very numerous, come under the Deno- *tary, in* *the thick* *ones.* *mination of SOLITARY Glands.*

These *Glands* discharge a *Liquor* into the *Intestines*, whether ordinarily for any thing more than *Lubrication* of the *Intestines*, and diluting their *Contents*, I will not determine: Though through these seems the greatest part of the discharge to be made; which either upon extraordinary *Fluxes*, or upon the Administration of *Catharticks*, we have frequent occasion to observe.

Blood Vessels.

These *Intestines* in general are furnish'd with Blood from the *Mesenterick Arteries*, which is return'd by the *Meseraick Veins*: But the *Duodenum* receives a Branch of an *Artery* from the

Duodena.

Cæliack, which is call'd *DUODENA*, to which answers a *Vein* of the same Name, that likewise returns the Blood to the *Porta*; and the *Rectum*

Hæmorrhoids, Internal and External.

others, which are call'd *HÆMORRHOIDS*; the *Internal* from the inferior *Mesenterick*, and the *External* from the *Hypogastrick*, with *Veins* corresponding of the same Name, that also go to the *Porta*. These *Vessels* spread the *Intestines* with abundance of *Ramifications*, and are frequently diversify'd in several Subjects of the same *Species*; much less are they to be depended upon for an uniform Appearance in Animals of a different Kind.

Nerves.

The *NERVES* of the *Intestines*, come some of them from those of the *Stomach*, and some from the great *Mesenterick Plexus*, which distributes Branches to all the *Intestines*.

The remaining *Vessels* of the *Intestines* are the *Lymphæducts* or *Venæ Lactææ*, of which in the following Chapter.

C H A P. XII.

Of the Mesentery, Lacteal Veins, Receptaculum Chyli, and Ductus Thoracicus Chyliferus.

THE MESENTERY (so call'd, because it is *Mesentery.* in the middle of the *Intestines*, and connects them together) consists of a double Membrane, variously interwoven with a diversity of Vessels, Nerves, Arteries, Veins, Lacteals, Adipose Ducts, and Glands.

It has been ordinarily divided into two Parts, *Divison.* the *Mesaraeum* and *Mesocolon*; the first appended to the *Intestina Tenuia*, and the latter to the *Crasssa*. This is a Division of no great Moment, and therefore no farther to be insisted on.

The *Origine* of the *Mesentery* is deriv'd from *Origine.* the first and third *Vertebrae* of the Loins, where the Productions of the *Peritonaeum* form two strong Membranes, which being join'd together make the *Mesentery*.

Between these two is a third Membrane, discover'd by the Learned Dr. *Wharton*, thicker than either of the other two, and perhaps, as some *Anatomists* think, properly to be look'd upon as the *Adipose Membrane*, abounding both *Adipose Membrane.* with Blood and *Adipose* Vessels, wherewith the *Mesentery* is ordinarily plentifully stor'd.

The Figure of it is near *Circular*, though for *Figure.* want of room lying in Folds and Wrinkles, it seems but of small Extent, yet when expanded, it is about four Ells in Circumference. *Circumference.*

Its Vessels are the same that we have accounted for in the preceding Chapter.

It has, interspers'd up and down, many *Glands*, *Glands.* which in a sound State are ordinarily cover'd with *Fat*, most of which seldom exceed the Magnitude,

tude of a small Nut, and are in Number and Position so various and uncertain, that it is in vain to attempt to give a certain Account of them, as to these Particulars.

*Pancreas
Asellii.*

In some Brutes, especially Dogs, there is a large Gland found in the middle of it, which by *Asellius* was call'd the *Pancreas*, to which most of the *Lacteal Vessels* resort; and from thence the *Chyle* is convey'd by large Vessels, but not so numerous as those before spoken of, which have their rise immediately from the *Intestines*, and are call'd *Lactea Secundi Generis*, which Division will scarcely be made out in Men, by any visible Distinction, their *Lacteals* not being gathered so uniformly to one Part, but distributed indifferently to all the *Glands* of the *Mesentery*.

Uses.

The *Use* of the *Mesentery* it self seems to be, First, To gather the *Intestines* into a narrow Compass, that the Course of the *Chyliferous Vessels* towards their *common Receptacle* may be but short; and next to cover and protect them and the *Blood Vessels*; And, Thirdly, So to connect and dispose the *Intestines*, as to secure them from an Entanglement, which might hinder their *Peristaltick Motion*.

*Origine of
the Lacteals.*

THE LACTEAL VESSELS, or VEINS, proceed in great number from the *Intestina Tenuia*, especially the *Jejunum*, from whence they arise in greater number than from the rest. It is yet a Doubt among the *Anatomists*, whether the *Intestina Crassa* afford any or not. The Impossibility of a Human Dissection proper for such an Inquiry, gives no room either to affirm or deny. But the Contents of the *Intestina Crassa* seem not likely to afford much *Chyle*, and therefore if there be any, 'tis probable they are but very few,

In *Brutes*, if dissected at a reasonable time after feeding, two, three or four hours, according to what they have fed upon, they may be seen very tumid and white; and, if wounded, the Chyle flows plentifully from them: But, if inspected when the Stomach of the Animal has been any time empty, they appear like *Lymphaticks*, visible indeed, but fill'd with a transparent Liquor. That the *Lactæals* have a Communication from the Cavities of the *Intestines*, is demonstrated by their Contents the *Chyle*. How their Pores are disposed to receive it, has not yet been discovered: Nor will Microscopes (I am afraid) shew us their Passages in the *Villous Coat* of the *Intestines*; nor is there any way yet known to us, whereby we can fill the *Lactæals* from the Cavities of the *Guts* after Death: We may be allow'd to imagine, that their Entrance into the *Gut* is oblique, not unlike that of the *Ureters*, since neither Wind nor Liquors can pass them from thence. Neither can their Passages be altogether like the *Ureters* into the *Bladder*, because we can no more make *Quick-silver* pass from the Trunks of the *Lactæal Vessels* into the *Guts*, than from the *Guts* into them. Since therefore those Pores of the *Lactæals* can only receive any thing in the Living State, we may be allowed to imagine, the *Peristaltick Motion* of the *Guts* so disposes them, that they then only receive the *Chyle*. This we think may be done by the *Circular and Longitudinal* Fibres of the *Intestines*, still applying the *Internal Coat* of the *Guts* to their Contents, by which means its Pores absorb the *Chyle* from the *Excrementitious part*.

Chyle.
how soon
made.

Commu-
nication
with the
Intestines.

Manner
of it.

After the *Chyle* is got into the *Lactæals*, it meets with the *Lympha* from the *Arteries* in the *Guts*, before it arrives in the Trunks of the *Lactæals* in the *Mesentery*: Though this Communication between the *Arteries* and the *Lac-*

Mixes
with the
Lympha.

icals, may be argued from the *Lacteals* having *Lympha* always in them, when they are not charged with *Chyle*; yet we are beholden to an Experiment for rendring it more certain; for by injecting *Mercury* into the *Mesenterick Arteries*, not only the *Mesenterick Veins* but *Lacteals* also are fill'd with it, and the *Mercury* may be driven on to the *Glands* of the *Mesentery*; of which Mr. *Cowper* has several very neat Preparations from *Human Bodies*, as well as *Quadrupeds*, by him, where the *Lacteals* are thus fill'd.

Pancreas
Asellii in
Dogs and
other
Brutes
only.

In Dogs there is a large Gland in the middle of the *Mesentery*, which, as before observed, is call'd the *Pancreas Asellii*, in which most, if not all the *Lacteals* terminate; and thence proceed in fewer but much larger Trunks, to the *Common Receptacle* discover'd by *Pecquet*.

But in Men no such Gland being ordinarily found, nor Live Dissections permitted, the *Vasa Lactea Secundi Generis* remain disputable: Tho' the *Receptacle*, and *Thoracic Duct*, which are as large as in any Animals whatsoever, in proportion to the Magnitude of their Bodies, leave us no room to doubt of the same way of Conveyance, though probably by more and less Channels between the *Glands* and the *Receptacle*, for the Reasons already given.

Valves in
the Lac-
teals.

These *Chyliferous Vessels*, opening with their little Mouths into the *Intestines*, receive the prepar'd fluid part of the *Aliment*, and appear at Intervals as it were girt and streighten'd, and when press'd, do not admit of a Reflux toward the *Intestines*, tho' the Liquor be easily propell'd towards the *Glands*; which argues that there are *Valves* in them, though they are too minute to have the *Structure* or *Form* of them examin'd.

Recepta-
culum
Chyli.

The *Receptaculum*, or *Cisterna Chyli*, lies near the left *Kidney*, under the *Emulgent* and great *Artery*: Its Capacity and Extent has been found

in

in Human Bodies, to be much larger than hitherto observed. Mr. Cowper has given us a Figure of a Preparation of it fill'd with Mercury, which he has still by him, consisting of three large Trunks, two of which are more than a quarter of an Inch in their Diameters, the third is somewhat less: This Division of it, he thinks, is more requisite in *Human Bodies* than in *Quadrupeds*, on the Account of their Position; the latter being *Horizontal*, the *Chyle* and *Lympha* does more readily pass from one large Receiver into this *Thoracic Duct*; but in Man its Progress being *Perpendicularly* ascending, it seems necessary to divide this Receptacle of *Chyle*, as we see in *Hydrostatical Engines*, in order to take off that Resistance which the Weight of the *Chyle* would occasion, were it contain'd in one common Receiver.

Its *Exit* is upwards in the *Thorax*, from whence it is call'd the *Ductus Thoracicus*, and it ends in the *Subclavian Vein*. Its Membrane is the same with that of the *Receptaculum*; besides that in the *Thorax*, it seems to be furnished with another *Integument* from the *Pleura*. A little more than the third Part of its Way, or about the Middle, it begins to divaricate, but after a Progress of about the Breadth of two *Vertebræ*, it unites again, and at last discharges it self with an oblique Insertion into the *Subclavian*, at which is placed a *Valve*, as there are in divers other Places in the Tract of it, which appear, as in the *Lacteals*, plainer by the Nodes, and the Denial of the Regress of the Liquor when press'd, than from any Demonstration that can be made to the Eye. From hence by the *Subclavian* the *Chyle* is deliver'd to the *Cava*, and so to the Heart, and thence again to all the Body by Means of the Arteries.

C H A P. XIII.

Of DIGESTION and CHYLIFICATION, and
the Apparatus thereunto conducing.

Organs of
Digestion
very va-
rious.

THE Almighty Author whom (to avoid Circumlocution and unnecessary Multiplication of Words) I often call *Nature*, having in his inscrutable Wisdom thought fit to create a great Variety of *Animals*, and to appoint 'em different Ways of subsisting, has also given them very different *Organs* to prepare that *Aliment*, by which they are to be *Nourished*.

Teeth,
why dif-
ferently
shap'd and
disposed in
Animals
of diffe-
rent Feed-
ing.

Of these some, being to break, and divide the *Mass* upon which they are to feed, are furnish'd with *TEETH* of different Kinds, according to their several Exigencies: Those, which feed upon *Flesh* have *Teeth* in every Part of *both* Jaws, some of which are to divide the *Mass* into *Morsels*: Others to comminute, and grind it after it is so divided, which from their different Offices are some call'd *Incisores*, or *Cutters*, others *Melares* or *Grinders*. Some *Animals* which are *Graminivorous* have the *Incisores* in the *Lower Jaw* only, because the Matter, upon which they feed, is easily broken into such *Parcels* as they can readily swallow.

Grani-
vorous
Animals
have no
Teeth.

Of the first Sort are *Men*, *Lyons*, *Bears*, *Wolves*, &c. of the latter are all the *Ruminant* Kind, such as have *Horns* and *Split Hoofs*, as *Oxen*, *Deer*, *Sheep*, &c. Others, which are generally such as live upon *Grain*, or other Sorts of *Food*, that do not want to be broken before they are swallow'd, have no *Teeth*; but instead of 'em have an *Ingluvies* or *Crop* wherein the *Food*, which is generally hard and dry, is macerated and softned before it is transmitted to the

But an
Inglu-
vies, or
Crop.

Stomach,

Stomach, which is *Musculous*, and stronger than in other *Animals*, and serves instead of *Teeth*, to break and grind the *Aliment* so macerated, in order to *Digestion*.

Of this sort are most kinds of *Fowl*, especially the GRANIVOROUS: Tho' some others which are *Birds* of *Prey*, and live upon *Flesh*, have no *Teeth*, yet they have something analogous to the *Incisors*, which is generally a *sharp, crooked Beak*, that serves to cut, and divide that, which they feed upon. These have no *Gizzards*, or *Musculous Stomachs*: And tho' there are some which have something like *Teeth* in their *Beaks*; yet those *Teeth* do not serve them either to divide or grind their *Food*, but to take the surer Hold of their *Prey* only, and are peculiar to the *Fishing Fowls*, whose *Prey* would otherways be more apt to escape them, and some of the *Water Fowls*, that eat *Herbs*, which, if their *Beaks* were not indented, would slip from 'em. These as well as some sorts of *Reptiles*, as the *Viper* kind, have *Teeth*, yet swallow their *Prey* whole.

Peculiar to Granivorous Fowl.

Gizzard peculiar to Granivorous Fowl.

I have mentioned these several kinds of *Dentition* in order only to examin the true Service of *Mastication*, which seems to be in a Manner peculiar to Men. For, tho' some other *Animals* use it, it seems to be only when their *Food* is only too hard, or too dry to be swallow'd unchew'd, as *Lyons*, *Dogs*, *Bears*, &c. when Necessity forces them to eat *Bones*: Or *Horses*, *Beans*, *Pease*, *Oats*, or other hard dry Things. In these Cases, *Mastication* seems to be purely preparatory to *Digestion*, and to be necessary to reduce the *Aliment* to such a State as may fit it for the Operation of the *Stomach*. But whether that contributes any more than bare *Comminution* remains yet a Question.

Mastication, of what Use.

Men, who *Masticate* more upon less Necessity than other *Animals*, are generally thought by *Authors* to *Ferment*.

In Men commences no Ferment.

thors in that *Action* to impart something to the *Mass* besides the *Communion*, which they think conduces in an extraordinary Manner, by way of *Ferment* or *Menstruum*, to the Solution of what they eat. But as this *Mastication* is not constant nor equal in all Men, who seem to digest with equal Facility; it is still a reasonable Doubt, whether some Uses, which they have assign'd to *Mastication*, be true ones or not, and whether *Luxury*, and the *Pleasure* of *Eating* has not taught Men to Chew, more than other Animals, in order to have the fuller Relish of their Food.

Prov'd by
Instances.

It is certain that many Creatures as well provided for *Mastication* as Men, and whose *Salival Glands* discharge as much as the *Human* into their Mouths, do not give themselves the Trouble of so much *Mastication*, and yet with the same *Apparatus* of *Organs* digest as quick, if not quicker, than Men do. And if *Old People*, who have lost all their *Teeth*, have sometimes worse *Digestions* than those who have not, other Causes may reasonably be assigned for that Infirmary of *Digestion*, than the Want of *Teeth*. For it is observable, that *Younger Persons*, who sometimes from other Accidents lose their *Teeth*, have not their *Digestive Faculty* weaken'd in Proportion; not to mention that many *Animals*, which have either no *Teeth*, or don't use those they have to chew with, seem to have as vigorous a *Concoction* as those that do. However I shall not deny, but that the *Comminution* of the *Aliment* between the *Teeth*, serves to promote, and hasten the *Solution* in the *Stomach*, which it may do by bare breaking the Cohesion, without supposing any Necessity of a *Menstruum* to do it afterwards.

Small
Birds, especially
Parrots,
have something
equivalent to
Mastication.

Many Species of BIRDS, especially the little Ones, that feed upon the smaller sorts of Seed,
and

and have no *Teeth*, nor any thing that bears Analogy to them (except the sharp Edges of their little *Beaks* may be thought to do so) make however an use of these *Beaks*, which in some Measure answers the end of *Mastication*. For by these they crack the Seeds, and with the help of their Tongues separate the soft Pulp from the dry Husk which they let fall: And particularly all of the *Parrot* kind, which will feed upon the Kernels of Nuts and other things, which are too large to be swallow'd whole, have a sort of Action, which looks very much like *Chewing*, by which they nibble upon what they eat, till they reduce it to very small Parts, tho' it seems not so much in order to mix it with any *Ferment*, as to reduce it to such a State as may make it pass the easier; and perhaps if they have any *Saliva*, it is no more than serves to lubricate, and facilitate the slipping of their Food down to the Stomach, which would not be so easily effected if it were dry, as most of the things they live upon are.

Those that generally feed upon *Grain*, as all the *Gallinaceous*, *Turkey*, *Pheasant*, and *Partridge* kind do, are observ'd to swallow every thing hastily, without any stop of it in their Mouths, or any Endeavour to break it there. But then indeed they have an *Ingluvies* or *Crop*, where it remains some time for *Maceration*, before it be transmitted to the *Stomach*, which those that contend for a *Ferment*, may say is given them instead of *Mastication* to impregnate the Aliment with that *Ferment*, which however is *gratis dictum*. For tho' the *Crop* of such *Fowls* be furnish'd with *Glands*, and the *Grain*, which they eat, be actually softned by the Soaking which it receives there; yet no real Solution or Separation of Parts is there made, but in the *Gizzard*, the Strength of whose *Muscles*, and *Internal Membranes*, which is hard and dry, as well as the little

Ingluvies
or *Crop*,
answers
the end of
Teeth in
Grani-
vorous
Fowl.

little *Stones*, and *Grains of Sand*, which these little *Fowls* swallow, shew these Parts to be contrived for *Attrition* and not for *Fermentation*, which the Narrowness and Strength of those Parts will not give room for.

*Lower
Extremity
of the Oe-
sophagus
Glandu-
lous in
Fowls,
that have
a Gizzard.*

It is true that most, if not all *Fowls* of this kind, have at the lower end of their *Oesophagus* a considerable Quantity of *Glands*, which afford a Liquor more visible than even those of the *Crow*, and which many *Anatomists* suppose to separate a *Fermentative Juice*. But for that we shall assign another Use, (which it cannot be deny'd to be proper for) when we come to speak of the *Conversion* of the dissolved Aliment into *Chyle*.

*Teeth in
many
Animals
not used
for Masti-
cation tho'
very sharp.*

There are divers kinds of *Animals* that not only have *Teeth*, but have them likewise sharper, and more numerous than *Men*, or indeed any sort of *Quadrupeds*, as divers kinds of *Fishes*, and all the *Serpent* kind, yet none of these use them for *Mastication*, as appears from their Figure and Position, which renders them absolutely unfit for it.

*Indented
in Fishes.*

For in *Fish*, many of which have three, four, or more Rows of *Teeth* in each *Jaw*, they are generally extreme sharp, and not planted opposite to each other, but so as to make, when the *Jaws* are closed, a kind of *Indentation* like that of two Saws, so wrought as to receive each other mutually, which is not a Position proper for *Grinding*, but very convenient for catching or laying hold of any thing. In the *Serpent* kind there are likewise divers Rows of *Teeth* extremely sharp, but all incurvated, and pointing towards the Throat, which is a Situation very proper for entangling and helping to swallow their Prey, which is usually small living Creatures, which they devour whole, but altogether unfit for dividing, comminuting or bruising. Some sorts of *Fish*, which prey upon the small *Shell-Fish*, such

*Recurved
in the
Serpent
kind.*

*Wherefore
Grinders
in some
sorts of
Fish.*

such as *Cockles*, *Muscles*, and *Sea-Snails*, have indeed a sort of *flat broad Teeth*, which resemble in some measure, in Use, as well as Figure, the *Grinders of Land Animals*; that is, they serve to break the Shells of those little Fish before-mentioned. These are variously disposed in the different *Animals*, some in the *Throat*, or upper Part of the *Oesophagus*, as in the *Orbis Marinus*, others even in the *Stomach* itself, as in *Lobsters* and *Crabs*, which have three at the Bottom with peculiar *Muscles* for their Motion and Compression.

As *Providence* has allotted for the Sustenance of the several kinds of *Animals* a great Variety of *Food*; so it has given them likewise a proportionable Diversity of Organs for the Preparation of it, besides those which serve for the first *Division* and *Mastication* already spoken of. The various sorts of *Animals* have, according to the different Occasions of their kind of Aliment, a great Variety of *Stomachs*, both in Point of Number and Structure, which may however, in the main, be reduced to three Principal or General Heads, of which in order to illustrate our Notion of *Concoction*, we shall speak more particularly. For tho' the several *Species* be almost indefinite, yet these being most considerable and best known to us, may suffice to shew the *Mechanical Apparatus of Nature* for this Operation.

The three I mean are the *Carnivorous*, the *Graminivorous*, and *Granivorous*. The different *Mechanism* of whose several *Stomachs* seems under one Head or other to include all the Conditions necessary for the *Solution* of any thing conducing to *Animal Nutrition*: And of each Species of which there are some Animals in each habitable Element, unless we will deny any *Fishes* to be strictly *Granivorous*, the Water not spontaneously affording them any such sort of *Food*.

Variety of Stomachs reducible to three General Heads or Kinds.

Of Carnivorous, Graminivorous, and Granivorous.

Accor-

*Account of
Appetite
why post-
pon'd.*

According to the usual Method, *Hunger* should first be accounted for, because it is that which provokes us to Eat, and therefore the accidental Cause of all that follows in the Course of *Digestion*. But that being agreed by all *Authors* (however differing among themselves otherwise in Opinion,) to depend upon the same *Active* or *Efficient Cause*, with *Digestion* in itself; it will save an unnecessary Multiplication of Words to postpone the Account of it to that of *Concoction*.

*Disagree-
ment of
Authors
about the
immediate
Instrument
of Conco-
ction.*

Authors are very little agreed about the immediate Instrument by which the Aliment is dissolv'd in the *Stomach*. Some will have it to be done by mere *Attrition* or grinding by the *Stomach* itself. Others impute it to a forcible *Dissolution* of *Heat*. But the Opinion, which is most espoused, is, that it is perform'd by means of a *Ferment* or *Menstruum*; yet of what Nature, or to what *Class* it belongs, they are as little agreed among themselves, as with those who would have it perform'd some other way.

*Attrition
or Grind-
ing.*

Those that would have it done by *Attrition*, impute it to the rubbing of the *Stomach*, upon the Aliment, by its *Peristaltick Motion*, and fortify themselves by the Observation that *Fowls*, and *Birds* that eat *Grain* and *Seeds*, have not only a strong *musculous Stomach*, lin'd inwardly with a *thick, tough Membrane*, fit for *grinding*, but do likewise assist that Operation of the *Stomach*, by swallowing *Grains* of *Sand*, and *little Stones*, which are always found mixt with their *Meat*, in the *Gizzards* of those *Fowls*, when they have eaten hard *Meat*, unless it be in *Domestick Fowls*, which have been coop'd up, and restrained from coming at them.

*Not the
Digestion
of Grani-
vorous
Animals.*

If indeed Men did feed, as those *Fowls* do, upon *Grain* or hard *Meat*, without *Mastication*, and were furnished with a *Stomach* so tight, firm,
and

and strong, and so lined, this would not be an improbable *Hypothesis*; but as our Food and manner of eating are very different, so is the Mechanism of *Nature*. And as the *Texture* of the main *Organ* of *Concoction*, the *Stomach*, is soft, smooth, and yielding, (Qualities altogether opposite to those that are requir'd to grinding) so Providence has given us an Appetite to things *resoluble* another way. But if *grinding* or *attrition* were the *human* way of *Digestion*, the *Mouth* surely, and not the *Stomach* would be the proper Place where it should be perform'd; for that is furnish'd with *Teeth*, proper Instruments for that purpose. But whatsoever *Mastication* may contribute towards *Digestion*, that it is not the only, nor indeed the main Instrument of it, we have already sufficiently proved by the Instances we have given of the many Animals, the Substance of whose Food is the same with ours, which *masticate* very little, and most of 'em not at all.

Wherefore if the *Stomach* were capable of grinding the Aliment, as some suppose, it must however in a little time necessarily be worn, as all other Bodies, which grind by Degrees, are, how hard soever; especially since many things, which we use as Food, are harder and tougher even than the *Stomach* itself.

But they are mistaken, who think that even in *granivorous* Fowls, the *Grain* which they eat is ground in the *Gizzard* when hard. For that *Grain*, which is found in the *Gizzards* of those Creatures, is, tho' unbroken, always macerated, swell'd, and soft: So that the *Gizzard* has not much more to do, than to break the *Husk* or *Cortex* of it, to reduce it to a *Pulp*. And for this very end it is, that all this sort of Animals are furnish'd with an *Ingluvies* or *Crop*, where the Aliment always makes a considerable stay,

Macera-
tion pre-
vious to
Attrition
even in
the Grani-
vorous.

and in which it is often found soft, tho' always unbroken, if it be *Grain*. Whether this *Maceration* proceeds from any Liquor separated by the *Glands* of the *Craw*, or from the *Water* which those *Fowls* drink, may be a reasonable Question. But as those *Glands* do not seem sufficient of themselves, to furnish Liquor enough for that purpose without their Drink ; so on the other Hand it is not unreasonable to believe, that the Liquor which they afford may contribute towards making their Drink, with which it mixes, more active and piercing, and so serve to soak it better and quicker than simple Water would do.

Nor Elix-
ation, or
Dissolution
by mere
force of
Heat.

Difficul-
ties affect-
ing this
Hypothe-
sis.

Those that would have the Aliment to be dissolv'd in the *Stomach*, by the mere Virtue of *Heat* only, like a kind of *Elixation* or *Stewing*, will find a great deal of difficulty to prove their *Hypothesis* reasonable, unless they call in some other *Mechanism*, or Circumstance, than I have hitherto had the Fortune to meet with among their Arguments. For none of them, that I know of, has given a satisfactory Reason, why Meat should dissolve faster in the *Stomach* than it does out of it by the same degree of *Heat*, or indeed a much greater. It would be impertinent at this time of Day, to pretend that *Culinary Fire* was not so *Natural* a *Dissolver*, as the *Vital Animal Heat* ; and yet no Care has been taken by those that hold this Opinion, to find out any other certain Property of this *Heat* to which they might rationally ascribe that *Acceleration* of *Solution*, which is observ'd in the *Stomach* by many degrees to out-strip that *Dissolution*, which is made in the usual Organs over a *common Fire* : And to pretend that the Heat was actually greater, and more intense, than that which is us'd in *Cooking* our Victuals, would not only be a barefac'd Assertion against *Fact*, but against *Reason* likewise : For if it really were so, why should

should not the *Stomach* itself be *boil'd* and *dissolved* by the *Heat*, as well as the *Meat* contain'd in it, which would constantly happen in all other Operations by Fire or Heat, if the Matter contain'd were as hard to be dissolv'd, and would resist as strongly as the Vessel containing? But not to pursue an Opinion any farther, which in my Judgment at least has a better Foundation than those who have casually espoused it, have hitherto been able to make out, we will proceed to examine the reigning *Hypothesis*, which, taken in its largest extent, is become of late the Favourite, and only prevailing Opinion.

Those, who observing how unqualifi'd the *Stomach* of *Carnivorous* Animals generally is for *Attrition* or Grinding, and therefore could not believe the Aliment to be reduced to a Pulp that way, and yet were not satisfy'd that the Incalcescence of the *Stomach* was sufficient for that Operation, have call'd in the help of a *Menstruum* or a *Dissolvent* Liquor, by means of which, they have thought to account better for the speedy *Resolution* of the Contents of the *Stomach*, than by either of the other more *Simple* ways.

But this being matter rather of Imagination, than Fact, easier to be supposed than prov'd, after first conceiving a necessity of such a Liquor, they have employ'd themselves more generally to invent the *Properties* and *Qualifications* of it, than to discover whether in reality it had a *Being* or *no*. So that this *Hypothesis* stands altogether upon Conjecture, as well as the *Existence* of their *Menstruum*; as to the *Nature*, *Properties*, and *Derivation* of it. From hence it comes to pass that such a variety of *Menstruums* have been invented, every Man feigning it to be such as he conceived would best answer the Difficulties and Doubts which he proposed to himself, to resolve by it. Hence some have fancy'd it to be an *Acid*, others

No Ferment or Menstruum peculiar to any of the Organs of Digestion.

Various Menstrua the Product of Imagination only.

others *Alkalious*, a third sort *Sulphureous*, a fourth *Acido-Sulphureous*, others *Alkalino-Sulphureous*, *Muriatick*, or of any other kind that their Fancy suggested to them, as proper for the Work of *Dissolution*, or exciting of *Appetite*.

Various Derivations of the Menstruum.

As many Conjectures they have had about the Place of *Nativity* of this *Menstruum*: Some fetch it from the *Spleen*, by the *Vas Breve*; others from the *Brain*, by the *Nerves*: Some from the *Blood*, by the *Arteries* in the *Stomach*, and others from the *Glands* of the *Mouth* and *Stomach*; in favour of all which, curious Notions and fine Speculations have been advanced at the Expence of Truth.

Acid Ferment, how taken up.

The *Chymists*, and *Physicians* chymically given, have generally been the Patrons of an *Acid Ferment*, upon a Notion at large, that *Acids* are the *Universal Dissolvents*; which Opinion many others have given into upon the Account of some few *Pbænomena*, which they could, or thought they could, resolve by it; but especially upon the Account of an *Aphorism* of *Hippocrates*, which they think countenances it, though mistakenly.

Hippocrates's Meaning mistaken.

This great Father of Physick has, *Aphor. I.*

* Εν τῇ π
χρονίῃσι
λειεντερίῃ-
σιν ὁξύρεϊ-
σιν ὁπι-
γενομένη,
μηγενομένη
πρωτερον,
σημεῖον ἀ-
γαθόν.

*Seet. 6. said, That * ACID BELCHINGS supervening upon inveterate LIENTERIES, (that is, upon Loosenesses from a too great Slipperiness of the INTESTINES) where they were not before, are a sign of mending. And Lib. 7. Epidem. he says again the same thing, a little more at large, and affirms, that whether this Symptom come spontaneously, or be procured by Art, it equally cures the Distemper, Ἴσως ὃ ὁπὶ καὶ τεχνήσασθαι, καὶ ὃ αἱ παραχαὶ αἱ ποιαῦται ἀλλοιῶσιν. Ἴσως ὃ καὶ ὁξύρεϊσμίαι λειεντερίην λύουσιν.* From hence some would infer, that *Hippocrates* suppos'd *Acids* to contribute to good Digestion; because those Signs of *Acidity* in the *Stomach*, whether they come spontaneously, or were artificially super-induc'd, generally signify, according

And his Authority brought to countenance a false Notion.

according to him, a *Solution* of that Disease which was attended with *Crude Dejections*.

But, in my mind, they strain his meaning very much, who will, from either of these Passages, make the *Divine Old Man* hold that the *Acidity* of the *Stomach* was necessary *ad Eupepsiam* in the *Natural* State. Whereas in truth all that he says in this case, concludes no more, than that these *Acid Belchings* signify'd that the State of the sick Person was alter'd for the better, when the *Assumpta* remain'd so long as to turn sour upon the *Stomach*: Or at most, that *Acids* given inwardly, and staying so long as to send their Exhalations upwards, might contribute to the Cure; a Position which any Body may admit, without supposing an *Acid* to be the necessary Instrument of *Concoction* in a *Natural* State. But what Signs soever *Acid Belchings* may be, in a *Morbid* State of this kind; no sort of *Ructus* or *Flatulence* whatsoever is any Sign of a good Digestion in a State of Health.

The Author's Construction of those Passages in Hippocrates.

However, they that have been prepossess'd in favour of an *Acid Menstruum* in the *Stomach*, have very greedily laid hold of this Occasion, to draw so great an Authority over to their side.

The other Argument, which they bring for their Opinion from the Observation, that *Acids* provoke *Appetite*, is as much strain'd and fallacious as this. For tho' *Acids* may, by pricking and vellicating the *Stomach*, procure a Sense of *Hunger*, and perhaps by mixing with, cutting, and precipitating that *Viscous Phlegm*, or Matter, with which the *Stomach* is sometimes over-loaded, even to the Prostration of *Appetite*, may accidentally procure a better *Digestion*, as they scour and cleanse the *Stomach*, yet that is no Proof that any such sort of *Menstruum* is necessary and primarily employ'd by *Nature* in the Action of *Digestion*. For divers other things which are not manifestly *Acid*, and

Argument from exciting Appetite. fallacious.

some that are even opposite to, and destructive of *Acids*, will sometimes do the same thing, as is notoriously known of the *Bitters*, especially to all *Practitioners* in *Physick*, and in some Cases, when judiciously apply'd, of the *Volatile Animal Salts*, and *Lixivial Vegetable* ones.

Acids improper Instruments of Chylification.

But neither do *Acids* seem naturally fit to promote *Chylification*, or to produce a *Liquor*, which they are of themselves so prone to coagulate, as we daily see by those *Coagulations*, which the slightest *Acids* produce in *Milk*, which is nothing else but *Chyle* a little defæcated. For tho' *Milk*, upon standing, will indeed turn sour without any other mixture; yet whenever it does so, Experience shews that the Form of the *mixt* is immediately destroy'd by it, and sufficiently demonstrates thereby that such a State of *Acidity* as these Men would suppose, is utterly inconsistent with the Being of that *Liquor*. Neither do they shew us, that if they could possibly consist together, there is in a *Human Body* any *Matrix* that should produce and furnish this *Acid Menstruum*, either in the *Stomach*, or any other Part.

Acid Remains of Chyle not sufficient, if existent.

The *sour remains* of *CHYLE*, which (after the Learned Dr. *Glisson*,) Dr. *Willis*, and so many others have taken up with, (for want of a better Expedient, that might have some Shew of a real Existence) to do the office of an *Acid Ferment*, or *Menstruum*, to cut and divide by its sharp corrosive Parts the new ingested Aliment in the *Stomach*, in so short a time as *Digestion* is ordinarily made in, is by no means an Instrument sufficient for the Purposes assigned. For, besides, that it is a Question whether any Part of the *Chylous Mass* does ever remain behind *in statu sano* in the Folds of the *Stomach* after *Chylification* complete, and Exinanition into the *Intestines*, it is still a farther Question, whether those Remains be naturally *sour* or not. *Autopsy* has never (that I know of)

of) favour'd the Affirmative part of either of these Points ; but has very often decided directly to the contrary, as I have frequently experienc'd in *Dogs*, which are as proper Subjects for such Tryals, as we can even desire. In these I have often expressly sought for these Remains of *Chyle*, but could never see any signs of any such thing, nor taste any the least Degree of *Acidity* upon the *inner Coat* of the *Stomach*, tho' I made my tryals upon 'em, when their Appetites appear'd to be as keen as they could possibly well be, and consequently this supposed *Vinegar* of the *Stomach* should have been in its highest state of Exaltation. Neither would any of 'em turn *Milk*, tho' I sometimes boil'd 'em in it, and at others kept it in them, as long as was reasonable to avoid making a fallacious Experiment.

Those that plead for these *Acescent Remains of Chyle* thought themselves sufficiently warranted, by the *Plicæ* or Folds of the *inner Coat* of the *Stomach*, to suppose a residue of some kind or other, and which they, supposing it to resemble *Milk* in that Property too, expected should turn Sour. Not to insist here upon the Infirmary of Reasonings drawn from *final Causes*, or from *Analogies* not sufficiently consider'd, both which are to be found in this *Hypothesis* of the *Acid Remains of Chyle* : It is easy to shew that the *Rugæ* or *Plicæ* of the *inner Membrane* of the *Stomach* were not unnecessarily fram'd only to detain this Matter, which they dream of, but upon Mechanical necessity. For the *outer Tunic* of the *Stomach* being made *Fibrous* and *Contractile*, or *Dilatable*, according as the *Stomach* is empty or full, the *inner* must necessarily obey its Motions, and either shrink up, or dilate with it, or otherwise lie wrinkled or folded up, when the *Exterior* was not dilated. But this Contractility is not to be found in any *Glandulous* or *Villous Membranes*,

Plicæ of the Stomach not made to detain any part of the Chyle.

Mechanical necessity of those Plicæ.

and consequently that it might sometimes be dilated to all the Dimensions of the *Stomach* when full, and yet comply with all its Coarctation in its narrowest State of Contraction (which Membranes of this Nature have no Power to do) it must be made to ply and fold as this Membrane does.

*Use of that
Structure.*

Those that love *final* Reasons for such things may be satisfy'd to know, that it is by no means convenient that the *inner Coat* of the *Stomach* should be endow'd with a power of Contraction like the *outward*. For all such *Contractile* Membranes are extremely *senfile*, which, upon many Scores, it is not proper the inside of the *Stomach* of Animals should be; since by its insensibility it is guarded against innumerable Provocations, which otherwise could not be avoided; and does here to the *senfile* Parts of the *Stomach*, what the *Cuticula* does to the *Cutis*.

*Different
Effects of
Rennet,
and the
suppos'd
Remains
of Chyle
in the
Stomach.*

Indeed many of those, who have contended for an *Acid Ferment* in the *Stomach*, have been very sensible of the insufficiency of any such *Acid* as might be form'd out of the *Remains* of *Chyle*. And have look'd out for other means, notwithstanding the famous Instance of the *Rennet-bag*; whose Liquor being Salted, and Pickled, bears no Analogy to what was found in the *Calve's Stomach* before Pickling: Nor indeed are the Effects of the *Rennet* so made any thing like to what they ascribe to this *Menstruum*; for that coagulalates, and this dissolves: This digests the *Milk*, which the *Calf* lives upon: And that destroys it, and renders it less fit for Nourishment than before.

*Meats
Pickied
or Salted
made
barder of
Digesti-
on.*

All the Tryals that have been made by *Artificial Digestions* to dissolve *Flesh*, have been made with *Acids* of another Class and Nature, than *sour Milk* or any of that low form of *Acids*, which they have found by Experience to pre-serve,

serve, not destroy it, as *Vinegar* and those *Salts* which abound with *Acids* do. Neither are those *Meats* so preserved, more obedient to the *Faculties* of the *Stomach* for having been *Pickled*, or of better *Nourishment*, as they should be, if they contain'd any thing congenial to the *Natural Ferment* of the *Stomach*: But on the contrary they become *harder* of *Digestion*, and of *less Nourishing Juice*.

Dr. *Havers* finding those *Acids* insufficient to dissolve and reduce *Flesh* to a *Pulp*, proposes an Experiment with *Oil of Vitriol*, which he says will do it. But being well aware of that obvious Objection, that it is morally impossible for the *Stomach* (without the utmost danger) to bear so highly corrosive an *Acid*, he proposes to qualify it by an *Oleaginous Mixture*, something like *Oil of Turpentine*. To illustrate this Notion, he puts *Raw Flesh*, *Crums of Bread*, *Oil of Turpentine*, and *Oil of Vitriol* together; and after shaking them well, commits them for four *Hours* together to *Digestion* in *Balneo Mariæ*; and then upon shaking his *Glass* again, he finds the *Meat* dissolved, and altogether making up a thickish *Pulp*: From whence he concludes that the *Menstruum*, which dissolves the *Aliment* in the *Stomach*, must be something of the Nature of the Mixture of those two *Oils*.

Dr. Havers's Experiment with Oils of Vitriol and Turpentine.

And Hypothesis.

But (with all due regard to the *Notions*, and Experiments of so Ingenious a Man) he has been too hasty in drawing his *Conclusions*, and should have register'd the other *Phænomena* of his Experiment, before he rais'd so large an *Hypothesis* upon so narrow a *Bottom*, as the seeming Agreement in one single Accident, viz. the *Reduction* of the *Meat* to a *Pulp*. He should have shewn that this *Pulp*, or the *Liquor* which it afforded, agreed perfectly in *Taste*, *Colour*, *Smell*, *Consistence*, and other Accidents with the *Chyme* or *Chyle*.

Deficient in many Particulars.

Chyle, that result from Animal Digestion. But, unless the Liquor, which this Mass afforded, was such a *Sweet, Soft, White Inodorous Juice*, all the Demonstration his Experiment amounts to, is, that the Oils of *Vitriol* and *Turpentine* mix'd, will resolve and reduce *Flesh* to a *Pulp*, but will not make *Chyle*; which shews his Experiment something worse than unconvulsive, that is, it is convulsive against the Use he would make of it.

Not helped
by his
other two
Experi-
ments.

However the Doctor is so satisfy'd in the sufficiency of his Experiment, that he proceeds to inquire how this *Fermentative Vitriolick Terebintinate Mixture* is form'd in an *Human Body*, and imagines to find two divers sorts of Liquors, one *Acid*, and the other *Sulphureous*, separated from the *Salival Glands*, and mix'd in, or about the *Mouth*, which, though apt to ferment upon their first Mixture, are yet, perhaps, apt to do so more considerably when they come to be digested by the Heat of the *STOMACH*. And in this Opinion he fortifies himself with two other Experiments, which he made after the same manner upon *Meat*, with Oil of *Vitriol* mixed severally, one with a Solution of Salt of *Tartar*, the other with Oil of *Camphire*, which did not succeed so well as the Experiment with Oil of *Turpentine*: From whence he draws this particular Conclusion. * And I do the rather think one of those Juices which constitute the *Saliva*, to be of the Nature of Oil of *Turpentine*, than of a fixed Salt, because it will correct and temper even Oil of *Vitriol*, so as to render it more tolerable to the *Fibres* of the *Stomach*. Not that I suppose the Acid part of the *Saliva* to come near to the Acidity of Oil of *Vitriol*. For tho' when they are mixed, they will make a Liquor that may not be injurious to the *Stomach*: Yet that Acid Juice, if it were so corrosive as Oil of *Vitriol*, would certainly be injurious and painful to the *Salivatory Ducts*, which convey it to the *Mouth* before

* Dis-
course con-
cerning
Concocti-
on, read
before the
Royal So-
ciety by
Dr. Ha-
vers, May
1699.

fore it is mixed with the Oleaginous Liquor. But I only say it is an Acid, and in some degree approaches to the Nature of that Oil.

It is obvious for the Reader to discern, that this Hypothesis stands purely upon the Foot of the Experiment before-mentioned, which has been shewn to be insufficient. But if it were not, nothing could make it certain, but the Actual Demonstration of the real Existence of such Liquors sincere, and apart in the Body, and their Conveyance together into the Stomach. For this purpose the Doctor assigns two pair of the Salival Glands to the Separation of the Acid Liquor, and the other two Pair for that of the Oil of Turpentine, as distinctly as if he had really found, and examin'd them sufficiently apart; which is the more surprising, because it is in reality no hard matter to do it, and that Experience does constantly shew, that these Glands do not afford Liquors so much as sensibly distinguishable, and that the Liquor which they do afford, does not in the least resemble either Oil of Vitriol, or Oil of Turpentine, or any kind of Acid or Volatile Essential Oil whatsoever. Nor indeed does any part of the Body afford any such kind of Substances at any time, or by any Tryal or Analysis whatsoever.

The Objections, which lie against this Hypothesis and that before-mentioned of the four Chyle, reach all sorts of Acid-Sulphureous Menstruums in the Stomach. For, if they be temperate like the first, they will not be corrosive enough to procure a Solution: If they be not, but exalted Acids, they are liable to the same Exceptions just now offered, and nothing resembling either of them, in either State, is to be found among all the Animal Fluids.

Those that hold the Menstruum of the Stomach to be Alkalious or Alkalino-Sulphureous, are somewhat

Precarious Foundation of this Hypothesis.

Acido-Sulphureous Menstrua, all obnoxious to the same Exceptions.

Alkalious or Alkalino-Sulphureous, a more plausible Invention.

Animal
Substances
all yield
Volatile
Alkalies.

But not
unalter'd
by the
Fire.

somewhat more countenanced in their Opinion, by the Substances which may be produc'd by the help of Fire from all sorts of *Animal Fluids*, all which yield *Volatile Alkalious Salts, Spirits, Phlegm, Oil, and Caput Mortuum*, differing only in proportion according to the different Mixture of the Liquor it is drawn from, whether that be *Urine, Blood, Bile*, or any other. But though all these Substances may be drawn from the *Natural Juices* of the Body, and may be allow'd to have pre-existed in them; yet it must be confess'd that all of them are in some measure alter'd by the Fire, though that alteration may, perhaps, be no more, than would result from any other *Resolution* of their Mixture. However, if any of them will, after this Separation, act so vigorously upon *Flesh*, as to dissolve it in such a *Heat*, as that of the *Stomach* may be granted to be, that Activity is certainly owing to the *Exaltation* which it had from the *Fire*. For no where in the Body, in its Natural State, do we find any *Salts* or *Sulphurs* so *exalted*, as to be capable of making such a *Dissolution*.

Neither can I see (let this exalted Salt or Sulphur be convey'd by what ways or means soever, the *Patrons* of this Opinion will or can suppose) what hinders the *Menstruum*, that so readily dissolves the *Aliment* from touching the *Stomach* it self, which is oftentimes of the same, or slighter Texture, than even the Matter itself, which it digests: And one might as well expect, that *Aqua fortis* put upon pieces of *Iron*, in an *Iron Pot*, should dissolve the pieces of the Metal, without touching the Vessel, which is an Experiment, I doubt, no *Chymist* would be persuaded to try.

This Ob-
jection
holds
equally
good a-
gainst all
sorts of
Menstrua
in the
Stomach.

This Objection, indeed, holds good against all kinds of *Menstrua* in the *Stomach*, as *Digesters*, whether we suppose an *Acid*, or *Alkalious, Sa-*
line,

line, or *Sulphureous*, or however mix'd : For still the Matter to be wrought upon is the same, or of the same kind, with the Vessel in which it is to work. They therefore, that will have a *Menstruum* to be the *Efficient Cause* of the *Dissolution* of the *Aliments* in the *Stomach*, are obliged to find something in the *Aliment* itself, before it comes into the *Stomach*, (which must be a Condition the *Stomach* itself has not) that disposes it to receive the Impression of the *Menstruum*.

This some endeavour to find in the Impreg-
nation of the *Aliment* with *Saliva* by means of *Mastication*. But, if the *Saliva* were a Juice so
very acrimonious, it would be impossible for it
never to offend the *Stomach*, especially consider-
ing the Quantities of it that many swallow even
upon an *empty Stomach*. However, the ready
Digestion that those Animals have, which do not
masticate at all, but swallow their *Prey whole*,
of which I have spoken at large in the begin-
ning of this Chapter, demonstrates the Insuffi-
ciency of that Cause.

Whatsoever therefore this *Ferment* or *Principle*
of *Fermentation* is, that sets the Wheels of *Dissolution* so nimbly agoing, it must be something
internal, and *inherent* in the *Aliment* itself, which
is an Opinion of ancient standing, but has been
rejected for that of a *Menstruum*, because an in-
ward Cause or Condition sufficient for this great
Operation, was not so expressly, and by Name
assign'd, as that speculative and curious Men-
might have wherewithal to satisfy their Enqui-
ries, and judge for themselves of the Truth of
the *Hypothesis*. However, they that went thus
far, tho' they did not clearly and explicitly dis-
cover all, did good Service to Truth ; and had
they, who rejected that Opinion, been as scrupu-
lous about the Evidence of those others, which
they took up in its stead, it is probable it had not
lost

*Saliva no
proper
Menstru-
um.*

*Menstru-
um, or
Principle
of Dige-
stion, must
be some-
thing In-
ternal, and
intimately
inherent
in the Ali-
ment it
self.*

lost ground, but that the *Latent Property*, upon which this grand *Phænomenon* depended, had long ere now been brought to light.

Three
things pre-
viously to
be consi-
dered.

In order therefore to discover what this great Secret is, which has been so long sought after with so much Industry, and so little Success, it will be necessary to consider three Things.

First, What is the *State* or *Condition* of the ALIMENT, as *Nature's*, or *our own* Preparation offers it to us, before it enters the MOUTH.

Aliment
reducible
to two
General
Heads. Of
which

2^{ly}, What *Changes* it undergoes in the MOUTH, before it reaches the STOMACH. And,

Two
States. In
their First
or Natural
State, sub-
ject to una-
voidable
Dissolu-
tion. Their

3^{ly}, What it suffers in the STOMACH, in or-
der to a thorough *Dissolution*.

Second a
State of
Actual
Decay.
Yet quick-
ned by the
Changes
wrought
upon them
in the
Mouth,
&c. These

First then, All those *Substances*, upon which any sorts of *Animals* feed, may be reduc'd to one of these two General Heads, either of ANIMAL or VEGETABLE, (for I know of no Creature that lives upon *Minerals*) which being *Substances* of their own Nature perishable, or subject to decay, their *Dissolution* may be hastned or retarded by Accidents.

From these things well attended to, we shall not only be able to observe the *Means* which *Nature* uses in the *Dissolution* of the Food in *Animal Stomachs*, but likewise of the great variety of Organs which she has made for that purpose ; at least we may by Attention arrive at it for those of whose *Anatomy* and way of *Living* we know the *History*.

Secondly, All those *Substances*, before they come into the MOUTH, or at least as soon as they come into it, are depriv'd of their ANIMAL or VEGETABLE *Life*, and consequently in a State of *natural* Decay, the *Principles* or *Means* of which they carry along with them, which are only put into, or hastned in their Action, by the *Changes* which they suffer in the *Mouth* or *Stomach*, &c.

From these things well attended to, we shall not only be able to observe the *Means* which *Nature* uses in the *Dissolution* of the Food in *Animal Stomachs*, but likewise of the great variety of Organs which she has made for that purpose ; at least we may by Attention arrive at it for those of whose *Anatomy* and way of *Living* we know the *History*.

Of all these kinds, which are reckon'd perfect, Organs of Digestion, why most Simple in Carnivorous Animals. the *Apparatus* for *Digestion* is most Simple in the CARNIVOROUS, (most of which will live upon Fruits likewise) in which their *Organs* are suited to their Dyet, which is the easiest of *Digestion*. For *Flesh*, *Fruits*, and *Sallad-Herbs*, being the most succulent of all the kinds of *Food* which any *Animals* naturally eat, they ferment of themselves, and come to a *digestive Solution* much more readily than *Grain* or *Seeds*, or any kind of *dry Vegetables*.

Men do however generally prepare those What Dressing of Meat contributes to Digestion. things which they eat, especially the *Flesh*, by divers kinds of *Dressing*. Whether this Custom was first introduced by *Luxury* or *Necessity*, is not a very material Enquiry here : But if by such *Dressing*, the parts of the *Meat* be render'd more loose, and less coherent, it becomes thereby of easier *Digestion* in the *Stomach* : If otherwise, as in *Pickles*, long salted, and dry'd Meats ; it becomes harder of *Digestion* for it, and generally of worse *Nourishment*.

Of all the things that Men eat, the *Horary* or Early Fruits, and *Summer Fruits* are of quickest *Solution*, if stript of their Rinds, because the Body of them is more soft and succulent, than that of other things we eat.

Next to these, in point of quick *Solution*, are Sallad Herbs, why easier of Digestion than the *Lacticia*, or the succulent *Sallad-Herbs*, which abounding with heterogeneous Juices easily ferment with Heat.

The last and longest of *Digestion*, of all the Flesh : Whence Roasting and Boiling, &c. introduced. kinds of Foods that CARNIVOROUS *Animals* naturally seek, is *Flesh*, which tho' its Parts be both succulent and soft, yet are neither so juicy, nor so soft and loosely coherent, as either of these before-mention'd. And perhaps, as well out of *Necessity* as *Luxury* ; Observation at first taught Men by *Roasting* and *Boiling*, and other kinds of *Dressing*,

Dressing, to loosen the *Compages*, and soften the Parts of what they were to eat. Yet many whole Countries, even to this Day, reject the whole Art of *Cookery*, and eat their Meat *raw*; and for any thing we can see, as much to the Advantage of their Health and Vigour, and perhaps as much to their Luxury.

Grain,
why by
Men ei-
ther con-
stantly
Ground
and Sifted,
or Softned
by Steep-
ing.

Men do likewise eat *Grain*, and sometimes *Roots*: But these are always prepar'd when us'd as a constant sort of Dyet, as Bread is by grinding, fermenting, and baking, whereby the Substance of the *Grain* is not only broken very small, but the mixt *Mass*, made of it afterwards, is occasion'd to cohere very loosely, and to contain a great deal of Air, which contributes to its future Dissolution in the *Stomach*. We do indeed use Grain divers other ways, besides in *Bread*, *Pies*, and *Puddings*, which have all something very analogous in their Preparation; but then we macerate and soften the Grain by previous Boiling or Steeping, and reduce it something nearer a State of *Fluor*, than it is found in the *Craw* of *Fowls*, which does the same Office, but need not carry it so far as our artificial Preparations do; because the *Gizzards* of *Fowls* being much stronger, and more Musculous, are consequently better able to grind it, especially by the Assistance of those *little Stones* or *Grains* of *Sand*, which they constantly swallow.

Indian
Bread
made of
Roots.
Marmou-
sets, Squi-
rels, &c.
commi-
nute their
Food with
their Fore-
teeth.

The INDIANS, many of 'em, use *Roots* instead of *Grain* to make their *Bread* of. But then even the rudest of them prepare it by some sort of *Maceration* and *Fermentation*, previous to their eating of it, that may reduce it to such a State as may give the *Stomach* least trouble in the Dissolution of it.

Those *Animals* which are obliged by Nature to live upon Food somewhat harder than that of Men, yet have no *Ingluvies* to prepare and mace-
rate

rate it for the *Stomach*, (such as *MARMOUSETS*, *SQUIRRELS*, *Rats*, *Field-Rats*, and *Mice*, that eat hard *wild Fruits*, *Nuts*, *Cheese*, *Roots*, &c.) are observed to nibble a long time with their *Incisores* or Fore-teeth, (which in those Creatures are very long, strong, and sharp) till they have exceedingly comminuted the Matters they eat, which are generally too hard for *Mastication* in these small Animals, and therefore they answer that end by gnawing that exceeding small with their Fore-teeth which they would not have Strength enough to break with *Grinders*.

Some have deny'd the *Fructus Horarii* and *Laticinia* to be of easy Digestion, because they observe, that they frequently produce *Flatulencies*, *Gripings*, and other troublesome Symptoms. But this Objection springs from want of considering *Digestion*, *Chylification*, and *Nutrition*, as distinct Operations, which they confounding together, call that *hard* of Digestion, which does not yield much *Chyle*, or prove good Nourishment. It is true indeed of many of these sorts of *Fruits* and *Herbs*, that they are apt to raise Disorders in the *Stomach* and *Intestines*. But this Fault proceeds not from a Difficulty to be digested, but from too great a promptitude to it, and from the *fermentative* Disposition of the Juices which they yield, which will not let them remain long enough in the *Stomach* and *Intestines* to be subacted or qualify'd, by the mixture of other things there, for good *Chyle* and Nourishment. So that their *Crudity*, or unalter'd Simplicity of Appearance when they come away, proceeds from an *over-hasty*, not too *sluggish* Solution in the *Stomach*.

This generally is the State, and these the Conditions of *Human Food*, before it comes into the Mouth. That of *other Animals* generally undergoes no alteration, except it be that of *Domestick Animals*, which sometimes eat *dry Meat* (so call'd

Early Fruits why generally thought to be of very bad Digestion.

Quadrupeds, that eat dry Meat, great Masticators.

in contra-distinction to that which is *Green*) which is harder of *Digestion* than the other ; but these are generally very great *Masticators*, whether they have but one simple Stomach as *Horses*, or four as the *Ruminants* have.

Second
State of
the Ali-
ment.

Whereto
tending.

The *second* State of the *Aliment*, which we propos'd to consider, is that which is introduc'd in the *Mouth*, which depends almost wholly upon *Mastication*. It seems to have two ends : The first to bruise, and comminute the Mass, and render its Cohesion more lax, and thereby the Separation more easy in the *Stomach* : The other is to mix, and, as it were, to incorporate it with the *Saliva*, and so render it more apt to swell and ferment in the *Stomach*. For all Liquors containing some *Air*, are apt to rarify more or less in Heat, according to the Proportion they contain of it. But in my Opinion, the principal use of the *Saliva*, as well as of the *Juice* separated in the *Stomach*, is to facilitate the Mixture or Incorporation of the several Fluids of the Meat and Drink, after the Solution of the more solid part is accomplished, and to unite them under that *Laëtescent Form* from which they are denominated *Chyle*.

Most con-
spicuous in
Rumi-
nants.

This Alteration of the *Aliment* in the *Mouth*, is more considerable in, and necessary to *Ruminants*, and other *Animals* that feed upon dryer and harder *Food* than the *Carnivorous* do : And indeed, Mankind excepted, who enjoy it in no Proportion to them, it seems to be peculiar to that sort of Animals, and accordingly Nature has provided for it by a particular Organization, in giving them a *Plurality* of *Stomachs* ; into the *first* of which, their Food is usually transmitted, without any other Alteration in the Mouth, than being a little rowl'd and wrap'd up together. This first Stomach, which is called the *Rumen*, is the largest of them, probably to contain as well the

The first
Stomach
or Rumen.

Drink,

Drink, as the whole crude Mass of their Aliment, which there lie and macerate together, and thence are transmitted again to the *Mouth*, to be *chew'd* and *comminuted* in order to their farther *Digestion* in the other *Ventricles*, in which use it perfectly answers the *Ingluvies* of *Fowls*.

This Use is incomparably illustrated by the Structure of the *Rumen*, or first Ventricle of *Camels*, in which are divers *Sacculi* that contain a considerable quantity of *Water*. This is an admirable Contrivance of *Providence*, to answer the Necessities of this Animal, which living in very dry desert Places, and feeding upon many sorts of hard dry Food, such as *Rice*, *Millet*, &c. would very often be in danger of Starving, even amidst the Plenty of *dry Meat*, which would not digest if they had not these *Reservatories* for *Water*, which oftentimes the Countries thro' which they march does not afford them in a long Tract of Ground. For if the *Water* which they drink, how large soever the quantity might be, were not kept apart in these Receptacles, it would pass off with the other Aliment upon the first discharge of the *Ventricle*, and they would not be able to sustain those long Journeys through dry Places, which all Accounts agree they do, for want of *digestible Food*.

Use of the Rumen illustrated by its Structure in Camels.

Use of the Sacculi in the Rumen of Camels.

These are all the Alterations that occur to me to be made in the *Mouth*, after which the Food is transmitted directly to the *Stomach* to be digested. This Operation we have already deny'd to be perform'd by a *Mensstruum*, either separated in the *Stomach*, or convey'd thither from elsewhere, or by *Attrition* or *Simple Heat*: Tho' we do not deny this latter to contribute to, and promote *Digestion*, as it serves to actuate the Causes of Dissolution innate to the Aliment it self.

Third State or Second Stage of the Aliment.

Principle
of Dissolu-
tion,
what.

We suppose then, all sorts of Aliment naturally to contain in them a *Principle of Dissolution*, (if I may be allow'd to use that Term) which after the *vital* and *vegetable Faculty* is extinct, begins to exert it self to the Dissolution or Destruction of the Subject, and consequently the *State of Decay* may be reckon'd to commence, whensoever the Accession of new Matter, or shifting of the Fluids (which in Plants as well as Animals we call *Circulation*) is at an end, though it does not always immediately shew it self in actual, visible Corruption, but proceeds by various Steps or Degrees, according as the Fluids, or containing Solids, are more or less disposed to *Activity* or *Resistance*.

The same
with that
of Vege-
table Life.

This *Principle of Corruption* is perhaps the same which in the State of *Circulation* and *Vegetation* was the *Principle of Life*, which being an *active Principle*, and now deny'd that *Passage* or *Vent* which it had before by the *progressive* or *circulatory Motion*, makes its way irregularly, and so destroys the Continuity of the *Solids* in which it is included, and introduces that Change in the Face of the whole Mass, which is call'd *Corruption*.

Air that
Principle.

The *Active Principle* (I here mean) is the *AIR*, which is mixed in considerable quantity with all sorts of *Fluids*, and is by Experience found as necessary to *Vegetable*, as *Animal Life*. This (tho' its Natural or Essential Motion, be *Expansive*, or *Quaquaversum*) being introduced into all Bodies, that have any kind of Life, mix'd with the *Fluids*, which make their Juices, has in them two kinds of Motion; one *Expansive*, by which it communicates that *Intestine Motion*, which all Juices have, and by which the containing parts are gradually extended, and grow; the other *Circulatory* or *Progressive*, which is not essential to it, but is occasion'd by the Renitency of the

Has two
sorts of
Motion in
Animal
and Ve-
getable
Bodies.

solid

solid parts of those Bodies, which obliges it to take that course which is most open and free, which is through the Vessels of *Animals* and *Plants*, which course being stopp'd, the *Expansive* still remains, and continues to act, till by degrees it has so far overcome the Resistance of the including Bodies, as to bring it self to an equal Degree of Expansion with the External Air; which it cannot do without destroying the Texture and Continuity, or *Specifick* degree of Cohesion of those *Solids*, which is that which is call'd a *State of Corruption*. State of Corruption, what.

For all Bodies, whether *Fluid* or *Solid*, that come within our certain Knowledge, are *Specifically* heavier, and consequently of a closer Texture than the Atmosphere, and cannot be reduced to a *Par* with it, *sine Interitu Subjecti*. All mixed Bodies Specifically heavier than the Atmosphere.

This *Expansive* or *Destructive* Quality of the *AIR* in these Bodies, may be two ways actuated, or promoted, either by weakning the *Tone* or *Cohesion* of the Parts of the including Body, and so facilitating the Work of the *AIR*; as it happens when Fruit is bruised, which will corrupt in that part much sooner than in that which is sound; or by extending the *Expansive* force of the *Air* it self, by *Heat*, or other co-operating Circumstances, and so helping it to overcome the Resistance the sooner. Corruption how accelerated.

Both these ways are used in many kinds of *Animal Digestion*: The first in Mastication, or the other *Analogous* already sufficiently spoken to: The Second by the *Heat* of the *Stomach*, which forcibly rarifying the *Air*, enables it to rend the including Bodies sooner to pieces, and so to let loose the *Fluids*, and perhaps likewise so far to comminute several parts of the *Solid*, as to make them sustainable in the Liquor; which latter is the Operation that compleats *Digestion* in the *Stomach*. Digestion how performed.

Not so
soon dis-
solved by
a Greater
Heat of
Culinary
Fire.

The Expe-
dition de-
pends upon
the Medi-
um.

Roasting,
Boiling,
and Stew-
ing, how
differenced
in point of
Celerity.

It may perhaps be objected; that the same Substances which the *Stomach* resolves so quickly into Particles, do by every day's Experience bear a much greater Heat of *culinary Fire*, and for a much longer time in the common Operations of *Cookery*, Roasting, Boiling, and Stewing, than the *Stomach* requires to resolve them into *Minima*.

To this Objection I answer, That this Degree of Expedition depends in great Measure upon the *Medium* in which it is perform'd. Thus, in *Roasting*, Meat will bear a much greater Heat than either in *Boiling* or *Stewing*, and the second way much fiercer and longer than in the latter: For as *Roasting* is perform'd in the *open Air*, as the Parts begin externally to warm, they extend and dilate, and so let out gradually part of the rarify'd included *Air*, by which means the Internal Succussions, on which this Dissolution depends, are very much weaken'd and abated. *Boiling* being perform'd in Water, the Pressure is greater, and consequently the Succussions to lift up the Weight, are proportionable in strength, and by this means the *Cocction* is hastned; and even in this way there are great differences; for the greater Weight of *Water* there is upon the Meat to be boil'd, the sooner it is done: And in *Stewing*, though the Heat be infinitely short of what is employ'd in the other ways of Dressing; the Operation is yet much more quick, because it is perform'd in a pretty close Vessel, and full, by which means the *Succussions* are more often repeated, and more strongly reverberated.

How in
Papin's
Digestor.

These are the common Observations of *Cooks*: But there is a way which yet more exactly resembles the Operation of the *Stomach*, which is by the *Digestor* invented by *Monsieur Papin*. In this the Meat is put together with so much Water as serves exactly to fill the Engine, which done, the Lid is screw'd on close, so as to admit of no external

external Air ; and is, with two or three lighted Charcoal, or a single small Lamp Flame, reduc'd to a perfect Pulp, or rather a Liquor, in a very few Minutes, as in six, eight, ten, twelve or sixteen, according to the toughness of the Matter to be digested, or the Augmentation of this little Fire, which will, in a very short time, this way, dissolve the hardest Bones themselves. The strict closure of this Engine, so as to exclude the Intervention, or Escape of Air, is the Occasion why the inward Succussions of the contain'd Matter, being equable and strong, resolve the whole into one seemingly *Homogeneous* Body, and mix the *Aqueous, Saline, Oleous*, and other Particles, so strongly together, as not to be easily at least separated, but while hot, to appear one Liquor, and when cold, an uniform Gelly, of a strength proportionate to the Quantity of *Flesh* or *Bones* dissolved in the Water.

This Experiment holds great *Analogy* with the *Operation* of the *Stomach*, which though it does not ordinarily dissolve such hard Bones, nor others so quick ; yet according to the Degree of its Structure, and the Proportion of its Heat, it may be said to do the same thing. For as the *Stomach* naturally closes upon the Aliments that descend into it, so it strictly embraces its Contents when full, and by keeping out any Extraneous *Air*, fortifies and invigorates the Succussions of that, which is naturally contain'd in the *Aliment*, which it receives : Which, however little it may be, is thereby enabled to break, and resolve into small Particles, the Bodies which included it so mix'd, *inter Minima*, with its Humours.

These, being thus reduc'd into *Fluor*, and intimately mix'd with the Liquids of the Drink, and Juices of the Stomach, compose that *Laetescent Liquor*, which is call'd *Chyle*, which is nothing

Analogy between this Operation and the Digestion of the Stomach.

Chylification, how perform'd.

Chyle,
how re-
ceiv'd into
the Lacte-
als.

but a Mixture of *Oily* and *Aqueous* Parts, incorporated together with the *Saline*, and which, while it remains mix'd with the groffer Parts in the Stomach, make a *thick, whitish, partly fluid Mass*, which we call the *Chyme*, which as soon as it is reduc'd to a Consistence, loose enough to be obedient to the Pressure and *Peristaltick* Motion, is gaadually work'd out through the *Pylorus* into the *Duodenum*, along the sides of which, and the rest of the *Intestina Tenuia*, the *Vasa Lactea* are planted, into whose extremely minute Orifices, the thinner and more Fluid part of this Mass, is press'd by the natural Contraction and *Peristaltick* Motion of the Guts, which is that *Chyle* of which the *Blood* is afterwards composed, and in Women that give Suck the *Milk* more immediately.

Appetite,
how rais'd.

When all the *Chyme* and *Chyle* is press'd out, the *Stomach*, which follows the Motions of its Contents, is again by means of its Muscular Coat, reduced to a State of Contraction, and by that means the Inner is brought to lie in Folds, which touching, and by means of the *Peristaltick* Motion, rubbing lightly upon one another, produce the gentle Sense of *Fretting* or *Vellication* which we call *HUNGER*, which being felt first in the upper Orifice, which is first evacuated, begins therefore first to prompt us to replenish: But as by degrees the Remainder of the Contents are expell'd, this Friction or Rubbing of the Membranes upon each other, spreads gradually over the whole *Stomach*, and renders our *Hunger* more urgent and impatient, till by a new Repletion we take away the Cause.

This Hypothesis
not liable
to the Ob-
jections
which the
former are,

This is all the *Fermentation*, and all the *Mensuum* that are required, to account for all the Natural *Phænomena* of *Hunger*, *Digestion*, and *Chylification*; and tho' they who admire Pompous Operose Proceedings, may think it too simple a
piece

piece of *Mechanism* for such great Effects, yet it is more sufficient than any of those magnificent Ways, which any of the most luxuriant Fancies have been yet able to invent, and is incumbered with none of those Inconveniencies which have attended all the *Hypotheses* by different *Menstrua*, and *Fermentations* that I have yet met with: For when any of those sharp provoking Liquors, which they have imagin'd have (as in Morbid Cases they sometimes do) affected the *Stomach*, the *Appetite* has been always vitious, and the *Digestion* bad. For in such Cases the Repletion with wholesome Food, not being sufficient to take off the Acrimony of such Humours, the *Fancy* has been upon the Hunt, as Sick *Fancies* generally are, for something out of the way, and perhaps extravagant and hurtful; and when such Humours are sent in Plenty upon the *Stomach*, they are by the Heat of the Part rarify'd into those Flatulencies, which are vulgarly call'd *Wind*, which by distending the *Stomach*, hinder the Folds of the inward *Nervous Membrane* from approaching one another, and so destroy natural *Appetite*, as they do *Digestion* likewise, by hindering the *Stomach* from closing exactly upon the Aliments, and so obstructing it in its Office, which requires that Stricture.

Pricking
Humours
upon the
Stomach,
a Disease.

Destroy
Appetite
and Dige-
stion.

The same way it is that hard Drinking destroys *Appetite* and *Digestion*: For by keeping the *Stomach* constantly distended with Liquor, the Tone of it is destroy'd, and till it can be recovered again, they never return.

Why hard
Drinking
does the
same.

We might by the same way account for all the other Diseases of the *Stomach*, in which *Appetite* or *Digestion* are affected; but to do that, would take up more room than the Design of this Work allows, and this Chapter is already swell'd to too great a Bulk.

T A B. II.

F I G. I.

THE Cavity of the *Abdomen*, after its *Muscles* and *Peritonæum* are remov'd, and the *Stomach*, *Intestines* and *Mesentery* taken out, to shew as many of the rest of its *Viscera in Situ* as could well be express'd in one View; the *Skin* and *Fat* being taken off; the *External Muscles* appear on the *Head*, *Arms*, *Breast* and *Thighs*.

A, The Superior Convex surface of the *Liver*.

B, Its Inferior Concave surface.

C, The *Ligamentum Umbilicale* turn'd up on the *Costilaginous Endings* of the *Ribs*.

a, The *Gall-Bladder* fill'd with *Gall*.

b, The *Ductus Cysticus*.

c, The *Ductus Hepaticus*, joining with the *Cysticus*, and making the *Ductus communis*.

d, A Probe inserted into the *Ductus Pancreaticus*.

e, Another Probe in the same Orifice or Caruncle in the *Duodenum* g; inserted into the *Ductus communis Biliaris*.

f, The Body of the *Pancreas*.

g, A Portion of the *Duodenum* open'd, to shew the exit of the *Biliary* and *Pancreatic Ducts*, as above at d, e.

h, The *Emulgent Vessels*

of the left Side, under which, near the great Artery at l, lies the *Receptaculum Chyli*, express'd Fig. III.

i i, The two *Kidnies*, of which the Right is somewhat lower than the Left.

k, The *Spleen*.

l, The descending Trunk of the *Great Artery*.

m, The ascending Trunk of the *Vena Cava*.

n n, The Two *Spermatick Arteries*, springing from the Trunk of the Artery at l.

o o, The Two *Spermatick Veins*, the Right emptying itself into the *Vena Cava* m; the Left into the *Emulgent Vein* h.

p p, The *Spermatick Veins* and *Arteries* passing on the *Psoas Muscles* towards the *Testes*.

q q q, The two *Ureters* descending from the *Kidnies* to r.

r, The *Bladder of Urine* here blow'd up.

s, The *Urachus* turn'd down.

t t, The *Vasa Deferentia* passing from each Testicle to the *Vesiculæ Seminales*,

u u, The *Processes* of the *Peritonæum*, covering the *Spermatick Vessels* as they pass to the *Testes*.

w w, The *Testes*.

† †, The two *Cremaster Muscles*.

✠ ✠, The *Glandulæ Inguinales*.

x x, The



xx, The *Spines* of the *Ossa Ilii*.

y, The *Os Pubis*, where the *Ligamentum Suspensorium Penis* springs, here express'd.

z, The *Dorsum Penis*.

DD, The *Cartilaginous* endings of the *Ribs*.

EE, The *Boney* parts of the *Ribs*.

**, The Division that is commonly made between the *Cartilaginous* and *Boney* parts of the *Ribs*, to raise the *Sternum* F, G, in order to inspect the *Viscera* of the *Thorax*.

F, The *Ensisiform* *Cartilage*.

G, The *Sternum* or *Os Pectoris*.

H, Part of the *Clavicle* bared.

I, The fore part of the *Os Hyodes*.

KK, The *Glandulæ Maxillæ inferioris*.

L, The inferior edge of the lower *Jaw-bone* bared.

M, The *Os Jugale*.

N, The *Parotid Gland*.

OO, Parts of the *Musculus Serratus Major Anticus*, that are indented with the *Obliquus descendens*.

P, The *Trunk* of the *Artery*, that is liable to be prick'd in letting *Blood* in the *Arm*.

Q, Part of the *Fascia Tendinosa* that springs from the *Musculus Biceps*, and passes over the *Artery* P.

R, The *Trunk* of the *Nerve* appears also at the *Flexure* of the *Cubit*.

S, The *Ligamentum Annulare*, or *Transversale Carpi*,

by which the *Tendons* binding the *Fingers* are kept in, when their *Muscles* are in *Action*.

T, The *Tendon* of the *Musculus Membranosus*, near its *Insertion* to the *Tibia* and *Fibula*.

VV, The *Patellæ*.

W, The lower *Appendix* of the *Thigh-bone*.

X, The *Tibia*.

1. The *Musculus Orbicularis Palpebrarum*.

2. *Zygomaticus*.

3. *Buccinator*.

4. *Temporalis*.

5. *Masseter*.

6. Parts of the *Digastrick* *Muscles* at their *Terminations*.

7. Parts of the *Mylohyoideus* under the *Digastricks*.

8. Part of the *Coracohyoideus*.

9. *Sternohyoideus*.

10. 10. *Mastoides* on both sides.

11. A small Portion of the *Levator Scapulæ*.

12. The *Pectoral* *Muscles*.

13. The *Deltoides*.

14. Part of the *Caracobrachialis*.

14. The *Biceps Cubiti*.

15. Part of the *Brachæus internus*.

16. *Supinator Radii longus*.

17. Part of the *Radialis Extensor Carpi*.

18. *Radialis Flexor Carpi*.

19. *Palmaris Longus*.

20. *Flexor Digitorum perforatus*.

21. *Ulnaris Flexor Carpi*.

22. Part of the *Tendons* that extend the *Thumb*.

23. *Abductor Pollicis*; adjacent to which, towards the *Palm*,

Palm, lies the *Flexor secundi Ossis Pollicis*.

24. *Abductor Minimi Digiti*; on which at Δ is placed the

(Δ) *Palmaris Brevis*.

δ , The Expansion of the *Palmaris longus* in the Palm.

$\epsilon\epsilon$, The Tendons that bend the Fingers.

25. Part of the *Extensor Communis Digitorum* in the left Hand.

26. *Abductor Pollicis ad Dorsum Manus*.

27. 27. The *Psoæ Mus-*

cles, over which the *Spermatick Vessels* and *Ureters* pass.

28. *Musculus iliacus internus*.

29. *Sartorius* on both sides.

30. *Musculus Communis Membranosus*.

31. The *Glutæus Medius*, covered with the tendinous Expansion of the *Glutæus Maximus*.

32. *Rectus Femoris*.

33. 33. *Vastus externus*.

34. 34. *Triceps*.

35. *Gracilis*.

36. *Vastus internus*.

F I G. II.

A Thin slice of the *Gall-Bladder* view'd with a Microscope, to shew its membranous structure, which is here distended and dry'd by blowing into its *Blood-Vessels*, whereby its *Parietes* became distended.

A A, The external and internal Membrane.

B B, Their Internal Membranous *Lamellæ*, framing a sort of Net-work by means of the *Air* insinuating into it. The like may be seen in the *Bladder* of *Urine*, or any Membranous part, if you insert a Blow-pipe between its *Lamellæ*,

or force Wind into its *Blood-Vessels*. It is by the same means *Butchers* blow up their *Veal*, either by forcing their Wind under the *Skin* near the *Navel* of the Creature, they afterwards drive it over the whole Body; or by *pricking* the *Skin* between the *Fore-Legs*, they suddenly pull the *Legs* from each other, and so let in the external Air. This Practice, though forbidden, is commonly done in this City, insomuch that you can hardly meet with a *Shoulder* of *Veal* without *Inflation*.

F I G. III.

THE *Receptaculum Chyli*, and part of the *Ductus Thoracicus*, fill'd with *Mercury*, and dry'd.

AAA, Three Trunks of

the *Receptaculum Chyli*. This Division of it has not been taken notice of by Anatomists, which makes me suspect the Descriptions we have

have hitherto had of it are from *Quadrupeds*, in whom, by reason of the Horizontal Position of this part, one *Receptacle* of *Chyle* may be sufficient. But in *Human Bodies*, its Position being *Perpendicular*, it seems necessary this *Receptacle* should be thus divided before it passes under the Trunk of the *Great Artery*, where it meets with repeated Compressions by means of the Pulsation of the *Artery*, which drives up the Contents of the *Thoracick Duct*.

B, One of the *Lacteal Vessels* ty'd up, by which the *Mercury* was injected.

C, The internal Surface of the Left *Lumbal Gland*, that lay on the Trunk of the *Artery* below the *Emulgents*.

D, The *Lympheducts* of the inferior Parts, before they empty themselves into the *Lumbal Gland C*.

E F, *Communicant Branches* of *Lymphæducts* between the *Right* and *Left Lumbal Glands*.

G, The *Ductus Thoracicus* above the *Diaphragm*, where it lies between the descending Trunk of the *Great Artery*, and *Vertebræ* of the *Thorax*.

H, About this part of the *Duct*, its *Valves* are very conspicuous, if you open it.

I, One of its Divisions (above which are divers others, that could not be express'd in this Page) whereby the *Ascent* of the *Chyle* may be the better carried on.

C H A P. XIV.

Of the PANCREAS.

THE PANCREAS is a *conglomerate Gland*, *Pancreas* situate near the first *Vertebræ* of the *Loins*, *Tab. II.* at the bottom of the *Stomach* on the hinder part of it, adhering, at its thicker *Extreme*, to the *Duodenum*, and from thence extended towards the *Spleen*. *Fig. I. f.*

It consists of innumerable small *Glands*, which *Its Sub-* though separately, being very firm, cohere but *stance.* loosely together, and therefore make the whole Body of it seem lax. These *Glands* seem colligated as well by the *Vessels* as by a *Membrane* proper to every one of them, and altogether are cloath'd with a very thin *Membrane* from the *Peritonæum*, which, if you blow into the *Excretory*

cretory Duct of the Pancreas, will let out the Air at several Places.

Colour. Its Colour is what we in *English* usually call a *Flesh Colour*, *White*, somewhat discolour'd with *Red*.

Figure. The Figure of it is somewhat like to that of a *Dog's Tongue*, but longer, being usually about eight or nine Fingers breadth long, and about two, or two and an half broad, and about one thick. Its Weight, according to Dr. *Wharton* and *De Graaf*, is about four or five Ounces.

Vessels. Its Arteries come from the *Cæliack*, both *Right* and *Left*. Its Veins go to the *Porta*. The Nerves come from the *Hepatick Plexus*, which is form'd under the *Liver* of some Branches of the *Intercostals*.

Excretory Duct. It has a peculiar Duct, first discover'd by *Wirtjungius*, and therefore call'd by his Name *Ductus Wirtjungianus*. This Duct is about the bigness of a *Raven's Quill* near the *Intestine*, tho more slender in parts remoter from it. It is ordinarily accounted and described as a single Duct: But *De Graaf* takes notice that he has seen it double sometimes in Men, and says, it is generally so in *Pheasants*, and many other *Fowls*: And it has happen'd to be so in most, if not all the human Bodies, and Dogs, that I have examin'd about it, since I took notice of that Suggestion.

Ostiola. It empties itself into the *Duodenum* generally by two several Mouths: One only of which is taken notice of by Anatomists, and opens itself four or five Fingers breadth below the *Pylorus*; and not seldom at the same *Foramen* with the *Ductus Communis Choledochus*. The other is somewhat lower, but at an uncertain distance. It has no *Papilla*, and is much smaller than the other, but is easily discover'd by blowing into the larger.

Tab. II.
Fig. I. d.

C H A P. XV.

Of the SPLEEN.

THE SPLEEN is a soft spongy *Viscus*, ap- Spleen.
 pearing externally of a darkish discolour'd
 red, or rather bluish Colour. Its *Figure* some- Colour.
 what approaching to that of a Tongue, though Figure
 in that particular the Appearance is not very con- uncertain,
 stant, it being sometimes triangular, sometimes as the
 almost round. Perhaps Authors have generally Number
 describ'd its Figure from the *Spleen* of Brutes, also.
 which has in most of them a nearer resemblance Vid. App.
 to a Tongue than the *Human* has. From such Tab.
 likewise the Figures of *Blancard*, here referr'd Blancard.
 to, seem to be drawn. Neither is the Number xxx.
 absolutely certain ; though generally we find but Fig. I.
 one, yet sometimes two, and sometimes three Fig. II.
 have been seen in the same subject, as divers *Ana-*
tomists aver.

It is situated in the left *Hypochondrium*, be- Situation.
 tween the *spurious Ribs* and the *Stomach* : A lit-
 tle Convex on the Surface towards the former,
 and Concave next to the *Stomach*.

Its Magnitude is so very various, that it is *Magni-*
 not precisely determinable : However, the ordi- tude.
 nary length assign'd is about six Inches long,
 three broad, and one thick.

It is connected by the *Omentum*, and by the *Connexion.*
 means of that, and the *Blood-Vessels* to the *Sto-*
mach, and *left Kidney*, and sometimes the upper
 part of it adheres to the *Diaphragm*.

It is cover'd with two *Tunics*, of which the *Coats.*
 External is deriv'd from the *Peritonæum*, but na-
 turally is so very thin, and liable to tear in Dis-
 section, as requires the *Anatomist* to handle it ve-
 ry gently. In some morbid Bodies it is very firm
 and

*Exterior
Coat.*

and thick, in others it becomes *Cartilaginous* and *Boney*: It is join'd to the *inner* and *proper Membrane*, only by the Intervention of the *Blood-Vessels*, whence it happens, that, upon the Separation of them, there appear upon the Surface of the *inner Membrane* little black or bloody points, shewing where these *Vessels* were broken off: Thro' these *Holes* or *Orifices* it is that the *Air* escapes, upon attempting to blow up the *Spleen* by the *Artery* or *Vein*, after this *outer Membrane* is separated from it; which Experiment generally succeeds in *Quadrupeds*, whilst this *Membrane* is left on. For if this *Membrane* be entire, when the *Spleen* is taken out, it may be blown up by any of its *Blood-Vessels*, or have its *Lymphaticks* fill'd with *Mercury*, if all the *Vessels* be carefully tied, except those you blow or pour into.

*Interior
Coat.*

The *Inner Tunic* consists of *Fibres* very curiously interwoven, from which it sends over innumerable *Threads* from one side to the other.

Cells.

From this *Coat*, very probably, are derived those innumerable *Cells*, or little *Bladders*, which make up the main Bulk of the *Spleen*. Though *Malpighius* rather thinks them to arise from the *Venous Duct*; a difference not very material. These *Cells* are for Number, Figure, and Magnitude, various and indeterminate, and best shewn by blowing up the *Spleen* through the *Trunk* of the *Vein*, and then laying a *Varnish* upon it, and drying it in the open *Air*, after which cutting it, the *Cells* remaining distended, shew their Figure and Capacity. These *Cells* communicate with one another, and exonerate themselves into the *Trunk* of the *Vein*.

*How
shewn.*

*Glands of
Malpighius.*

The inside of these *Cells* is furnished with divers *Glands*, according to *Malpighius*, which adhering to one another, six, seven, eight, or more together, form a sort of small *conglomerate Glands*, in which the *Arteries* and *Nerves* seem to terminate,

nate. Their Existence is however very questionable, as not appearing plainly here, nor in the *Penis* at all, whose Structure is the same, but by no body said to be Glandulous.

Its *Arteries* come from a large Trunk of the *Cœliack*, and are contorted in their Progress to the *Spleen*: The *Veins* go to the left Branch of the *Porta*, and are call'd from the *Viscus*, the *Splenic Artery* and *Vein*. These Blood-Vessels are in respect to the Bulk of the *Viscus* very large, and manifestly communicate with each other. For whether you pour Water into the *Artery* or *Vein*, it presently discharges it self promiscuously by either; so that here is no sign of any *Valve*, nor indeed through the whole *Porta*, whatever some have told us.

Its *Nerves* come from the *Plexus*, call'd by *Willis Plexus Lienaris*, which lies near the bottom of the *Stomach* on the left side. All these Vessels, as soon as they enter the *Spleen*, are wrapt up in one common *Capsula* or *Membrane*, and are plentifully distributed through the whole Substance of the *Spleen*, the *Nerves* every where accompanying the *Arteries*, and circling them variously about. Of the *Vein* within the *Spleen* there are divers Branches or Trunks, which on all sides, as well towards the Substance of the *Spleen* as the *Arteries*, are punch'd through with many little *Holes*.

The *Spleen* abounds with *Lymphæducts*, in proportion to its Magnitude equally, if not more than any part of the Body: But these do not so plainly appear, unless in live Dissections, with a Ligature upon the Vessels, or on blowing into the Veins.

The *Anastomoses* between the *Arteries* and *Veins* of the *Spleen*, have been already observ'd to be more plain in this *Viscus* than any other part of the Body, which will yet more fully appear,

pear, if *Mercury* be poured into either *Vein* or *Artery*. For it indifferently fills both from either ; and if the *Spleen* be hung up so fill'd, with the *Vessels* tied for three Weeks or a Month, and then cut, it exhibits them all in their proper *Figures* and *Dimensions*.

Spleen receives a greater Proportion of Blood than any other part.

By the *Diameter* of the *Arteries* and *Veins* thus exhibited, as well as from the *Capacity* of the *Trunk* of the *Splenic Artery*, which equals that of both the *Mesenterick Arteries*, this *Viscus* appears to be evidently furnish'd with a greater proportion of Blood than any other in the Body.

Ingenious Conjecture of Mr. Cowper, concerning the Use of the Spleen.

MR. COWPER from hence, and from the manifest immediate Communication between the *Arteries* and *Veins* in this Part, draws a very natural Conjecture of the Use of this *Viscus*, at least of this peculiar Mechanism. He imagines it to be a subordinate circulatory Organ, and that, by this Congress of the *Arterial* and *Venous* Blood here, an *Impetus* is communicated to the latter, by which its Progress through the Ramifications of the *Porta* to the *Cava* is promoted, which otherwise would be so broken by the double Ramifications of the *Porta*, as to want Strength sufficient to carry it to the Heart. This Hypothesis, deriv'd purely from the Mechanism of the Part, carries a Face of great Probability, and deserves to be consider'd by all the Learned and Judicious. But whether it be the *sole* or *ultimate* Use of the *Viscus*, I ask leave still to doubt.

Other Use uncertain.

Many other *Hypotheses* have been offered concerning the Use of this *Viscus*, but none of them so satisfactory to me as to induce me to amuse the Reader about any of them ; and therefore I shall leave it to farther Enquiry, intending myself to prosecute, at more leisure, some Suspitions which I have entertain'd concerning it, which I think not yet sufficiently confirm'd, to offer them to the Publick.

C H A P. XVI.

Of the LIVER, GALL-BLADDER, and DUCTS.

THE LIVER is a large Glandulous Viscus, of a red bloodyish Colour, situated immediately under the Diaphragm, in the right Hypochondrium, which it almost fills, and thence stretching itself over the right side of the Stomach, towards the left Hypochondrium, reaches beyond the Cartilago Ensiformis, growing gradually thinner and narrower.

Liver, its
Descrip-
tion.
Its Situa-
tion.
Tab. II.
Fig. I.
A. B.

The upper part of it is *Convex*, and perfectly smooth or polish'd: The under *Concave*, and somewhat more uneven, having four large *Fissures*, one through which the *Umbilical Ligament*, or *Rope*, passes; a second on the left side, receiving the *Pylorus*, and the beginning of the *Duodenum*; a third on the right side, near the *Margin*, in which the *Gall-Bladder* is lodged; and the last in the upper part, affording a Passage to the *Vena Cava*.

Surface
Concave,
Convex.
Fissures.

The *Figure* of it is somewhat approaching to round, with thin edges, not altogether even, but notch'd in some Places. Its *Magnitude* is various in different Subjects, according to the Proportion of the Body, though in a *Fœtus*, or a very young Animal, it is always proportionably much larger than in Adults, in which Dr. *Glisson* reckons the ordinary length of it to be equal to that of the *Arm*, from the *Elbow* to the *Wrist*, measuring it by the *Concave Surface*, which is much the shortest, and differs from the *Convex* about as much as the *String* does from a *Bow* moderately bent. The same *Author* computes the *Breadth* to equal the *Length* of the *Hand*.

Figure.
Magni-
tude.

In some
Brutes di-
vided into
Lobes.

In *Dogs* and divers other Animals, it is divided into several distinct *Lobes*; but in Men it is generally one continued Body, having one small Protuberance, which is accounted (by many) a little *Lobe*. Yet it has been sometimes observ'd to have been divided into two or three *Lobes*.

Some-
times in
Men.
Connexion
by the
Ligamen-
tum Sus-
pensori-
um.

It is connected to divers Parts, but especially to the *Diaphragm*, to which it is fastned by a broad, thin, but strong semi-circular Ligament, call'd its *Suspensory* Ligament, and derived, according to Dr. *Glisson*, from the common *Capsula* of the *Porta* and *Gall-Ducts*. The Continuity of this Ligament, being interrupted by the Perforation of the *Vena Cava*, has given occasion to some Anatomists to divide it into two. It is likewise by another strong *Ligament*, which has its Origin from the external Coat of the *Liver*, or, which is all one, from the *Peritonæum*, ty'd to the *Cartilago Xyphoides*. And by a third, which is form'd out of the *Umbilical* Vessels, which in Adults dry up and become a *Ligament*, it is connected to the Tendons of the *Abdominal* Muscles in the *Linea Alba* at the *Navel*. These several *Ligaments* serve to keep it in its due Situation; besides which, it has other Connexions by the Blood-Vessels, which need not be mentioned under this Head.

Two other
Liga-
ments.

And the
Blood-
Vessels.

Motion
depending
on the
Dia-
phragm.

The Liver has a Motion, though not proper to it self, but depending on that of the *Diaphragm*, to which being so firmly connected, it must of necessity obey its Motion, and in *Expiration* be drawn up; and in *Inspiration*, when that is contracted, and approaches towards a Plane, be let down again.

First Tu-
nic, or
Common
Mem-
brane.
Substance.

It is cover'd with a thin smooth *Membrane*, deriv'd from the *Peritonæum*, which is to be separated from the Substance of the Liver, though not without some Danger of Laceration.

Its Substance is *Vascular* and *Glandulous*, which latter part of it is very soft and fryable, and pret-
ty

ty easily scrap'd off from the Vessels, to which the *Glands* every where adhere as it were in Bunches; which has made Anatomists call the considerable ones the *Internal Lobes* of the *Liver*.

Internal Lobules.

The *Glands* adhering thus to the Vessels, and constituting those *Lobes*, are wrapp'd up together in *proper Membranes*, whence this appearance of distinct *Lobes*. Every one of these *Glands*, according to the Observation of *Malpighius*, is composed of six unequal Sides or Faces, which are better to be seen in *Fishes*, and some other of those Animals which are call'd *imperfect*, than in *Men* or *Animals* of a *larger* Kind.

Proper Membrane constituting the Internal Lobes.

Figure of the Glands.

These *Glands* are each of them cloath'd with their proper Membrane, and have each an *Excretory Duct*, several of which joining together, form little Trunks, which run all along with the Branches of the *Porta*, and these again uniting, form longer Trunks, which are always found full of *Bile*, and make the *Porus Bilarius*, which being distributed all over the *Liver*, receives in the manner foregoing the *Bile*, which is separated by these Glands, and terminating in the *Meatus Hepaticus*, and that in the *Ductus Communis*, at length discharges the *Bile* into the *Duodenum*.

Peculiar Membrane Excretory Ducts.

Porus Bilarius.

Besides this discharge, which is suppos'd to be the great one, it likewise delivers part of its *Bile* into the *Gall-Bladder*, by a Duct pretended to be discover'd first by *Monsieur Perrault*, and by him call'd *Ductus Cyst-hepaticus*, though long before describ'd by *Dr. Glisson*, but in one respect defectively, in that he does not take notice of any immediate Communication between the *Porus Bilarius* and the *Gall-Bladder*, by means of that Duct. *Verheyen*, according to the course of the *Bile* through that Duct, from the *Porus Bilarius*, reverses the former Name, and more properly calls it *Hepaticysticus*, and asserts the right of *Dr. Glisson* to the Discovery, which perhaps the Doctor

Cyst-Hepatic Ducts.

First describ'd by Dr. Glisson.

App.
Tab. xxix.
Fig. 4.
C C C.
H H H.
Experi-
ment dis-
covering
the Cyst-
Hepatic
Duct.

had otherwise lost, for want of dignifying it with a distinct Name; for he barely calls it a *Trunk*.

The way to discover this Duct, is to tye the *Meatus Cysticus*, and then to blow strongly into the *Ductus Communis*, by which means the Air will come round by this Duct into the *Gall-Bladder*, which will be thereby blown up: And if afterwards the *Bladder*, and the *Meatus Cysticus*, from the Ligature upwards, be laid open, the *Blast* will be observ'd to penetrate not only into the *Bladder*, but likewise into the *Meatus* it self, by several little Apertures. This Experiment I have not yet had opportunity to try in a Man, but in an Ox-Liver it succeeded so, as to convince us, that even in an Ox, this Duct had not been sufficiently describ'd.

Observa-
tions of
Verhey-
en, con-
cerning
this Duct.
Vid. App.
Tab. xxix.
Fig. 2. H.
k k. iii.

Verheyen, in the Prosecution of this Discovery, has observ'd in the *Gall-Bladder* of an Ox, not only one, but three Orifices opening into it, by blowing into each of which, the *Flatus* penetrated the *Ductus Hepaticus*, and offering to trace them, he found that two of them join'd together before they reach'd the *Hepatick Duct*, and enter'd into it with a single Stem and Orifice: The other he observ'd to be join'd just at its Orifice into the *Gall Bladder* by another Duct, whose Roots were dispers'd through the Substance of the Liver. In another Subject the same Author says, He discover'd four *Hepaticy-stick Ducts*, through each of which he blew into the *Gall-Bladder*. In farther Proof of this Discovery, he examin'd the *Gall-Bladder* of divers Oxen, and never failed of finding one or two such Orifices opening into the *Vesicula Fellis*.

Dr. Brant-
thwait's
Experi-
ment and
Discovery.

These Observations of this Inquisitive Anatomist, are confirm'd by an Experiment which was made before divers of us, by that Ingenious Learned Gentleman Dr. *Branthwait*, (when he prepar'd

prepar'd a Body for his Lecture on this *Viscus*, in the Theatre of the College, before the whole Society) who by blowing into the *Porus Bilarius*, after having open'd the *Gall-Bladder*, shew'd us the Wind issuing at a great many Orifices, which gives us occasion to think, that if these Ducts were carefully trac'd, they would be found to come from every considerable Branch of the *Porus Bilarius*.

One of these Ducts the forementioned curious One of these Ducts described from Verheyen. Author gives us a Description of, through the whole Tract of it, which, till Autopsy shall better inform us about the rest, may serve to give us an Idea of them all. It runs from the *Porus Bilarius* to the *Vesicula Fellis*, in length about eight Inches, and is about the thickness of a small Straw, but somewhat thicker near the *Gall-Bladder*, where it is join'd just at the Insertion by another Duct, the Roots of which are disseminated through the Substance of the Liver. In its Course it receives divers *Tubuli*, or little *Gall-Ducts*, from the *Glands* of the *Liver*, most of which are inserted so as to point towards the *Vesicula Fellis*; though some about the Extremity nearest to the *Hepatick Duct*, point towards that; from which Contrivance the Author argues reasonably enough, that probably when the *Gall-Bladder* is so full, as not to admit of any more, they discharge themselves into the *Hepatick Duct*, though their ordinary Course be to the *Bladder*: Which is farther confirm'd by the Experiment of Blowing into the *Porus Bilarius*, which easily fills the *Gall-Bladder*, though the same *Flatus* cannot, by any Compression, be made to return that way to the *Porus Bilarius* again: Yet if the end of a *Blow Pipe* be put into the Orifice at the *Bladder*, the *Flatus* pierces readily to the *Hepatick Duct*, which shews that the sole Obstacle is the *Oblique* Insertion, or *Valves*, of the Mouth

of these *Ducts*; and that in the Channel, the *Flatus*, and consequently the *Bile*, moves indifferently either way.

Oblique
Insertion
of this
Duct.

This *Duct* is inserted obliquely into the *Vesicula Fellea*, and running a little way between its Membranes, discharges it self into it about three Inches above the Neck, after the same manner as the *Ureters* do into the *Urinary Bladder*.

Porus Bi-
larius, or
Hepatic
Duct.

The PORUS BILARIUS, or HEPATICK DUCT, which is the most considerable of all the *Biliary Ducts*, is form'd after the manner of a *Vein*, from the Concurrence of infinite small Ramifications springing from *Glands*, which united, make up divers Trunks, equal in Magnitude to the Branches of the *Hepatic Arteries*, which accompany them, Branch for Branch, through the whole Substance of the *Liver*, and are wrapp'd up in the same *Capsula* with the *Porta*: These Branches are about the size of a Wheat-straw, but the largest of these are sometimes so stretched, as to be big enough to admit a Man's little Finger, and are distinguishable from the Ramifications of the *Porta*, chiefly by their Contents. Besides the *Capsula* which is common to that and the *Porta*, it has a thick white proper Coat, like the *Musculous* one of an *Artery*. On the Concave side of the *Liver*, the several Ramifications meet and form one Trunk or Channel, which is call'd more peculiarly the *Hepatic Duct*, about the bigness of a *Goose-Quill*, which descending about two Inches, meets with the *Cystick Duct*, and together with it, forms that which is call'd the *Ductus Communis*, which descending in a right Line about four Inches, farther discharges it self into the *Duodenum*, by an oblique Insertion oftentimes at the same Aperture with the *Pancreatick Duct*.

App.
Tab. xxix.
Fig. 2.
a a a.
Capacity
of its
Branches.

Its Trunk.

Its Ori-
fice.

Gall-
Bladder.

App.
Tab. xxix.
Fig. 4.
E. A.

The GALL-BLADDER is a *Membranous Receptacle* in Figure somewhat like a *Pear*, situated at
the

the lower Margin of the Liver on the Concave side :

It is about the Bigness of a Pullet's Egg. It adheres to the Liver, not only by its Vessels which it receives from it, but likewise by its Membranes, the External or Common being the same with that of the Liver, and is a good part of its Substance, as it were immers'd in the Liver : The lower part which hangs out of the Liver, rests, upon the Pylorus of the Stomach or Colon, which it dyes Yellow by those parts of Gall which transude through its Membranes.

Its Connection.

Its *Membranes* are reckon'd five, an outer or common one from the *Peritonæum*, an inner one on that side which adheres to the *Liver* from the *Capsula* of the *Porta*, and of the *Porus Bilarius*, besides three Proper.

The *Exterior* of the *Proper Membranes*, consists of a great Number of white *Fibres*, irregularly interwoven with a great Number of *Vessels*, upon the account of which it is call'd the **VASCULOUS Coat**.

*Exterior or Vascu-
lous.*

The *Second* consists of a sort of fleshy *Fibres* of a double Order, and therefore it is call'd the **MUSCULAR Coat**. The first Order of these *Fibres* is *Longitudinal*, but somewhat irregularly disposed : The Second are *Annular*, but alike irregular with the former, often intersecting one another, as the former do, at very acute Angles.

Second Muscular.

The *Third* or *Inner Coat*, which is very much wrinkled, consists of a great Number of *Glands*, like the *Crusta Villosa* of the *Stomach*, and is therefore properly call'd its **Glandulous Coat** : It separates a *Mucus*, which, lining all the inside of this *Bladder*, serves to defend it from the extreme Acrimony of the *Bile*, which is in this part abundantly thinner, and much more Acrimonious, than in the *Porus Bilarius*.

*Third or Inner Glandu-
lous.*

Thus

Vide
Tab. II.
Fig. II.

Thus the *Tunicks* of the *Gall-Bladder* are described by some, who are nice in distinguishing Membranes. But to us, assisted by the Microscope upon a piece of a *Gall-Bladder* dry'd, the reason of this accurate Distinction did not appear. But, on the other hand, these several Orders of *Fibres*, before describ'd, seem'd to be only an infinite Perplexity of Vessels diversly ramify'd, with some *Fibres* perhaps disorderly mixed, which, when the Subject is dry, are not easily to be distinguished.

Fundus.
Collum.

The *Bladder* has been divided into two parts, the *Fundus* or *Bottom*, and the *Collum* or *Neck*. At the Orifice of which latter is placed a *Ring* or *Circle* of pretty strong *Muscular Fibres*, which serve as a *Sphincter* to constrict the Orifice of the *Gall-Bladder*, and hinder the too liberal discharge of the *Bile*.

Sphincter.

Meatus
Cysticus.
App.
Tab. xxix.
Fig. 4.
G G.

Just below these *Fibres*, which by some have been mistaken for a *Valve*, is continu'd another *Biliary Duct*, call'd *Meatus Cysticus*, which is about the Bigness of a *Goose-Quill*, and at about two Inches distance from the *Gall-Bladder* is join'd to the *Meatus Hepaticus*, which together form the *Ductus Communis* before-mention'd.

Vena
Porta con-
trary to
all other
Veins,
shoots from
a Trunk
into Bran-
ches like
an Artery.
Ibid.

Fig. 2. B.

c c c.
Fig. 4. I.
Trunk of
the Porta,
but short.

Besides these *Gall-Vessels*, which are peculiar to the *Liver*, it abounds with *Blood-Vessels*, especially *Veins*, of which the *Porta* and *Cava* are disseminated through the whole Substance of it: And here it is particularly remarkable of the *Porta*, that after the manner of *Arteries*, it shoots itself from a *Trunk* into *Branches*, and being at last lost in *Capillaries*, it delivers the Blood into the *Cava*, by which it is immediately convey'd to the *Heart*.

The *Porta* is form'd out of the Concurrence of divers *Veins*, which meeting together make one of the most considerable *Venous Trunks* of the Body, as to its Bulk, though contrary to the Course

Course of other Veins, it runs not far in a *Trunk*, but is, as before observ'd, soon distributed again, by Ramifications, into the *Liver*.

According to the vulgar Method, we might divide this *Vein* into Branches *without* the *Liver*, and Branches *within*, and a *Trunk* intermediate. But being of Opinion, that this Method is not so clear as it ought to be, and the Branches, as they are call'd, *without* the *Liver*, are not so properly *Branches* as *Roots*, which have, by Anatomists, been dignified by distinct Names, from the Parts from whence they come: We shall not amuse the Reader with it, but proceed to enumerate those *Veins*, which conspire towards the Formation of this *Trunk*, which having been described in their proper Places, or being to be described there, we shall not enlarge upon their Descriptions here, but content ourselves only to name them, with a short Hint from whence they come.

These are from the *Placenta Uterina*, in a *Fætus* the *Vena Umbilicalis*, from the *Gall-Bladder* the *Cysticæ Gemellæ*, from the upper part of the *Stomach* the *Pylorica*, or *Gastrica Dextra*, which goes to the *Trunk*: The *Gastrica Major*, and *Minor Sinistræ* from the *Stomach*, (of which the Major is form'd out of the *Coronaria Ventriculi*) the *Epiplois Sinistra*, and *Postica* from the *Omentum*, the *Gastroepiplois* from the *Stomach* and *Omentum*, the *Vas*, or *Vasa Brevia*, from the *Stomach*; the *Splenica* from the *Spleen*, all join to form the *Left* or *Splenick Branch* of the *Porta*. The *Right*, call'd also the *Mesenterick Branch*, consists of the *Gastrica* and *Epiploica dextra*, from the *Stomach* and *Omentum*, the *Duodena* from the *Duodenum* and *Jejunum*; the *Hæmorrhoidalis Interna*, from the *Intestinum Rectum* and *Colon*; the *Mesariacks* from the *Mesentery*: By means of all which recited Vessels, the

Vulgar Division of the Porta, why not follow'd. Branches without the Liver, not properly so call'd.

concurring to form the Trunk of the Porta.

Porta

Porta receives the Blood from most of the *Viscera* of the *Abdomen*, and, after the Coalescence of its Branches, enters the *Liver* in a *Trunk*, immediately under the Surface whereof, having first form'd a kind of *Sinus*, it is divided into two principal Branches, and those again into five, which scatter innumerable Ramifications through the whole Substance of the *Liver*. The several larger Branches are, together with the Branches of the *Porus Biliaris*, wrapped up in a common *Capsula* or Membrane already described.

Branches
of the
Cava in
the Liver,
improperly
so call'd.

The *Blood* which is convey'd into the *Liver* by the *Porta*, after the manner of the *Artery*, is received again, after having been purged of its Bile in the *Glands* of the *Liver*, into innumerable *Veins*, which empty themselves into the *Cava*, and are vulgarly, though improperly, call'd *Branches* of the *Cava*, but ought indeed to be esteem'd the proper Blood-Vessels of the *Liver*, as the *Emulgent*s are of the *Kidnies*, and which do as all others, except the *Pulmonary Vein*, exonerate themselves into the *Cava*, the common Channel by which the Blood returns to the *Heart*.

Hepatic
Arteries.
App.
Tab. xxix.
Fig. 1.
I. L.

The *Arteries* which are call'd the *Hepatic*, come from the Right Branch of the *Cæliack*. The Learned Dr. *Glisson* thinks, that the *Porta* does so much the Office of an *Artery*, that no more are necessary than those only which minister Nourishment to the *Membranes* and *Capsula*: Tho' I cannot but think that they serve for the Nourishment of the whole Part, and perhaps for other Uses.

General
Mistake of
Anato-
mists con-
cerning
these Ar-
teries.

Anatomists, having generally form'd their Ideas of the *Hepatic Arteries*, from the Dissection of the *Livers* of *Quadrupeds*, (especially *Horses* and *Oxen*) have represented them much less, than really they are in *Human Bodies*, because they have found them so in those Subjects, and have concluded

concluded them proportionally less in *Human*; whereas they are in Fact much bigger, as appears by several Preparations, which are to be seen at Mr. *Cowper's*, in which the Stem of each *Hepatic Artery* is as large as a Goose-Quill, and the Branches in the *Liver* are every where equal in Magnitude to those of the *Porus Bilarius*, which they accompany. Perhaps in *Human Bodies* in this *Viscus* a larger *Stream*, and directer *Impetus* of *Arterious Blood* is required to drive on the *Venous*, because of the *Erect* Posture, than in Animals of an *Horizontal* Position of Body. For which reason *Horses*, &c. though of much larger Size, and having much bigger *Livers*, have these *Arteries* much smaller than *Men*, and not only so, but curl'd like the Tendrels of a Vine, to break the *Impetus*, which in that Posture is not so necessary, as in the *Erect*. Why larger in Human Bodies, than in Horses, and greater Animals.

These sorts of Differences in the Mechanism of *Animals*, upon the Score of the Position of their Bodies, occur so often, that it would be no mean Service to *Anatomy*, and the *Oeconomical History* of *Animals*, if any one, who had Opportunity and Ability, would give us a History of those Variations of the Parts of *Animals*, which spring from the different Postures of their Bodies. Desideratum in Anatomy.

The *Nerves* come from the *Plexus*, call'd by Dr. *Willis* the *Hepatic Plexus*, form'd on the right *Hypochondrium* by the Branches of the *Intercostal*, which wrapping themselves about the *Arteries*, make a sort of a Net-work, and after spreading themselves upon the Membrane and Surface, disappear. Nerves

The *Lymphæducts* are numerous, but not easily observed in a *Human Subject*, for want of Live Dissections, or at least whilst the Subject is warm; but in other Animals, which may be dissected alive, if a Ligature be laid upon the *Porta* and the *Bilary* Lymphæducts. App. Tab. xxix. Fig. 1. Q Q. R R.

Ibid. P.

Biliary Duets, they become very conspicuous. But, by blowing into the *Arteries* or *Gall-Duets*, they may be made visible, and appear very numerous on the *Concave* Surface of the *Liver*, where they run to a *Lymphatick Gland*, from which the *Exporting Lymphæduets* arise, and empty themselves into the *Receptaculum Chyli*.

C H A P. XVII.

Of the Kidnies, and Glandulæ Renales.

Vide
Tab. II.
Fi. I. ii.
Kidnies.
Situation
on each
side.
Figure.
Magni-
tude.

THE KIDNIES are situated on each side, the Right between the *Liver* and *Musculus Lumbaris*, on the right side; the Left between the *Spleen* and the same Muscle on that side; only the Right is somewhat lower in Men than the Left: Though in *Brutes* it is generally the contrary. It is in *Figure* pretty like a *Bean*, but not quite so flat. They are in Men commonly about five Inches long, and three broad, and about one and a half thick.

Exterior
or Adipose
Mem-
brane.

They lie between the Duplication of the *Peritonæum*, which affords them their Exterior Membrane, which, in Persons not emaciated, generally abounds with *Fat*; whence it has by some been call'd *Tunica Adiposa*. This Membrane envelops them but loosely, and in *Fat* Persons is swell'd by the *Fat* to a very considerable thickness; but not so much as in *Quadrupeds*, because the *Horizontal* Position of their Bodies leaves a greater space between their *Intestines*, and these Parts in which their *Fat* abounds.

Interior
Membrane.

The *Interior* Membrane arises from the *Exterior* of the Blood-Vessels, and adheres pretty closely, yet not so as not to be easily separable.

Connexion.

By their external Membrane they are connected to the *Loins*, by their Blood-Vessels to the *Aorta*.

Aorta and *Cava*, and by the *Ureter* to the *Bladder* of *Urine*: The *Right* is likewise sometimes connected to the *Intestinum Cæcum*, and sometimes to the *Liver*; the *Left* to the *Colon* and *Spleen*.

The *Substance* of them is made up of *Glands* *Exterior* and *Vessels* of several kinds, the *Exterior* part of *Substance* which carries a very different Face from the *Interior*: The *Exterior* consisting mostly of *Glands*, and very fine Ramifications of the Blood-Vessels, which latter shooting their Branches round, like Lines drawn from a Centre, form divers little elegant Star-like Figures, which cutting the *Kidney* longitudinally, shew themselves very readily. This part of the *Substance* is in colour reddish, and is about a third part of the depth of the *Kidney*.

Next within these appear a Number of small *Interior* *Urinary Vessels*, which look like pale fleshy *Fibres*, which joining together make the *Carunculæ Papillares*, which are only a Bundle or *Col-* *Papillæ*.
lection of these little *Urinary Pipes*, and these a- *Append.*
gain end in short *Tubulous Bodies*, or larger Pipes, *Tab. xxxi.*
answering to the Number of the *Papillæ*, which *Fig. 2.*
are usually twelve, and are call'd *Fistulæ Membranaceæ*, being only Productions of the Membranous Cell, call'd the *Pelvis*, which is a Cavity *Sinus ar*
in the Concave part of the *Kidney*, possess'd by *Pelvis.*
a Dilatation of the *Ureter*.

The *Ureters* are long round *Membranaceous* *Ureters.*
Pipes protended from the *Kidnies* to the *Bladder*, *Tab. II.*
for the Conveyance of the *Urine*. *Fig. 1.*

They run with an Inflexion somewhat resembling the Letter *S*, and are obliquely inserted into the *Bladder* near the *Neck*, after having run some space betwixt the *Membranes*. *q. q. q. Their Course and Insertion.*

They are ordinarily about the bigness of a *Duck's Quill*, though in *Calculous* Cases they are sometimes distended to a much greater size. *Their Magnitude.*

They

*Blood-
Vessels.*

They receive *Arteries* from, and return *Veins* to the Trunks of the *Aorta* and *Cava*, and *Nerves* from the *Intercostals*, and from the *Medulla Lumbaris*, by means of which they are rendred extremely fenfile, and though distendable, as we have said, to a vast degree, yet not without excessive Pain.

Emulgents.
Tab. II.
Fig. I. h.

The *Kidnies* have *Arteries* and *Veins*, which are call'd by one common Name *Emulgents*, and are usually but one of a sort to each Kidney, though they have been observ'd sometimes to vary in their Number. The *Emulgent Arteries* spring from the *Aorta* by a single Root, but usually, at the entrance into the *Kidnies*, divide themselves into two Branches, and those again into divers others, the several Ramifications of which are distributed into all the *Glands*, which make the Cortical part of the *Kidnies*, and which in young *Children*, and some *Brutes*, especially in *Hogs*, are congregated into Bunches like distinct *Lobes*, as those in the *Lungs* are, which Inequality is visible in the Surface, but disappears by Age and Time, which level and render them smooth in *Men*.

*Secretion
of Urine.*

From the Blood convey'd by these *Arteries*, the *Urine* is separated by the *Glands* into the *Ducts*, or *Papillæ*, and *Fistulæ Membranaceæ* before-mention'd, and thence through the *Pelvis* and *Ureters* into the *Bladder*. After the *Secretion* of *Urine*, the Blood is return'd by the *Emulgent Veins* to the *Cava*.

*Adipose
Artery
and Vein.*

Besides these Blood-Vessels, there is a peculiar Artery and Vein, which serve the Exterior Membrane of the *Kidnies*, and are by a distinct Name call'd the *Adipose Artery* and *Vein*.

Nerves.

The *Nerves* of the *Kidnies* come from the *Plexus* of each side, call'd the *Plexus Renalis*, which is form'd out of the Branches of the *Intercostal*, and *Medulla Spinalis*. The Twigs of which

which twine pretty thick about the *Emulgents*, especially the *Artery*.

There are *Lymphaticks* belonging to the *Kidnies*, which in *Brutes* are observ'd to exonerate themselves into *Pecquet's Receptacle*; but Human Subjects are examin'd too long after Death, for them to appear so plain; yet if you blow into the *Arteries*, *Veins*, or *Ureter*, the rest being ty'd, you'll see the *Lymphæducts* distended.

Between the Trunks of the *Aorta* and *Cava*, and the *Kidnies* a little above the *Emulgents*, are situated two *Glands* of an irregular uncertein Figure, call'd *Glandulæ Renales*, *Capsulæ Atrabilariae*, *Renes Succenturiati*, which in a *Fœtus* almost equal the *Kidnies* themselves in Magnitude, but gradually shrink, till in Adult Persons they come to be very inconsiderable. They have their Blood-Vessels sometimes from the neighbouring Trunks, and sometimes from the *Emulgents* and *Nerves* from the *Plexus Renalis*. They have a Cavity which is usually fill'd with a blackish Liquor, but no proper Excretory Duct having been yet discover'd, we remain in the dark as to the Use of these *Glands*.

CHAP. XVIII.

Of the URINARY BLADDER and URETHRA.

THE URINARY BLADDER, the Receptacle of Urine, is situated in the *Pelvis* of the *Abdomen* in Men, immediately upon the *Intestinum Rectum*; in Women, upon the *Vagina Uteri*, which lies betwixt them. Its Figure in *Quadrupeds* resembles a Pear with the Basis upwards, but in Human Bodies the lower part is almost upon the level with the upper; and its Orifice or Neck, lies side-ways, while the *Fundus*, or Bottom, (as it is called) which in a Human

Vide
Tab. II.
Fig. I. r.

Fundus,
or broad
part.

Bladder is very broad, rests upon the *Rectum*, or *Vagina Uteri*.

*Membranes
or Coats.*

It consists of three Membranes, the outward of which, or common Membrane, is derived from the *Peritonæum*: The middle one, which is call'd the *Musculous Coat*, is compos'd of fleshy Fibres running longitudinally, which are intersected by others, irregularly disposed a-cross them: The third is said to be Nervous, and has a great Number of Glands under it, which separate a Mucous Matter to defend it from the Acrimony of the *Urine*, which otherwise might offend it, being extremely sensible.

Tab. III.
h.

It is capable of being extended to a great degree, and consequently the External Dimensions of it are liable to great Alterations.

Connexion.

It is ty'd to the *Peritonæum* and Navel by the *Urachus*, which after Birth, serves only as a Ligament. The Neck of it in Men adheres firmly to the *Rectum*, and in Women to the *Vagina Uteri*, and before to the *Ossa Pubis*, by means of the *Peritonæum*.

*Perforations
for the
Ureters.*

It is pierced by the Ureters, two or three Inches above the Neck, which as we have already observ'd, are very obliquely inserted to hinder the Return of the *Urine*.

Sphincter.

At the *Exit* of the Bladder, to prevent the perpetual dripping of *Urine*, is plac'd a Muscle consisting of circular Fibres, which is call'd the *Sphincter Vesicæ*. This Muscle keeps the Bladder constantly shut, and is only open'd when, by the Contraction of the Abdominal Muscles, the Bladder is compress'd, and the *Urine* forc'd out.

Urethra.

Adjoining to the Neck of the Bladder is the *Urethra*, which is the Excretory Pipe or Tube, for the *Urine* to pass thro'; which is much shorter in Women than in Men, and much wider, and capable of greater Distention, as the Operation of extracting Stones by Dilatation proves.

The

The Bladder and *Urethra* have Veins and Arteries from the *Epigastricks* and *Iliacks*, and in Women from the *Spermaticks* likewise, and Nerves from two *Plexus* in the *Pelvis* of the *Abdomen*, form'd out of Branches of the *Par Vagum*, and the Nerves of the *Os Sacrum* united.

There are three pretty notable Glands discover'd not long since by Mr. *Cowper*, whose Excretory Ducts terminate in the *Urethra*, and which are situate not far behind its Membrane. But these relating, in their Use, rather to the Parts of *Generation* than to the *Urinary*, they shall be describ'd with the *Penis*.

C H A P. XIX.

Of the Parts of Generation proper to Men.

Under this Head of the GENITAL Parts of *Men*, are included, as Principal of this Chapter, *The SPERMATICK Vessels, The TESTICLES, The PARASTATÆ, The VASA DEFERENTIA, The VESICULÆ SEMINALES, The PROSTATES, and The SCROTUM.* Vide Ap. Tab. xxxii. & xxxiii.

THE SPERMATICK *Vessels*, otherwise call'd *Vasa Præparantia*, are two Arteries and two Veins, though in these Vessels Nature does not always observe the same Rule, varying often their Number, Origination, and Insertion; but most commonly they hold that Number.

The *Spermatick Arteries* ordinarily arise from the fore-part of the Trunk of the *Aorta*, about two Inches below the *Emulgents*. Spermatick Arteries.

The Structure of these Arteries is very singular: For, contrary to the Course of all other Arteries, which are largest at their Exit from the Trunk whence they part, and grow gradually Peculiar Structure of these Arteries.

App.
Tab. xxxii.
Fig. I.

less in their Course, these are less in their Origin from the *Aorta*, than in their Progress towards the *Testes*. By this Stricture at their Orifice the Blood receives a Check at its first going off from these Parts, whereby its *Impetus* and Velocity are abated. The same End is answer'd by a different Mechanism in *Quadrupeds*, whose Spermatick Arteries are curl'd and contorted in their Passage like a Screw. For which different Methods of doing the same thing, * Mr. *Cowper* gives a Reason, which seems to me beyond Exception just; (*viz.*) “ That if the Human Spermatick Arteries “ were contorted, as in *Quadrupeds*, the Aper- “ tures in the *Abdominal* Muscles of Men must “ be much larger than now they are, and would “ frequently let the Intestines descend into the “ *Scrotum*; an Accident, which, however, often “ happens. To such Ruptures, (as they are cal- “ led) *Quadrupeds* are not so liable, though the “ Passages for the Spermatick Vessels be much “ wider in them than in Men; because the Po- “ sition of the Trunks of their Bodies being “ *horizontal*, their Intestines cannot press on the “ Processes of the *Peritonæum*, as in Men whose “ Posture is erect.”

Their
Course.

These Arteries, immediately after their meet- ing with the Spermatick Veins, enter together with them, the inner *Lamella* of the *Peritonæum*, which affords them a Coat, wrapp'd up in which they run along the *Psoæ* Muscles, till they reach the *Processus* of the *Peritonæum*, bestowing some Branches in their Passage upon the *Peritonæum*. Here insinuating themselves into the Duplication of the *Processus*, and being streightly cloathed with it, they pass the *Foramina* of the oblique and transverse Muscles of the *Abdomen*, and at about three or four Fingers breadth from the *Testicles*, are divided into two unequal Branches, the bigger of which goes to the *Testicle* itself, where,

Ib. N.
And
Division.
Ib. O.

where, after having enter'd the Substance of it, it is split into an abundance of Ramifications, disposed like the Tendrils of Vines which are dispersed all through it. The lesser descends to Ib. P. the *Parastata* or *Epididymis*, and there is distributed, as the other is, in the *Testicle*.

The *Processus* of the *Peritonæum* embraces these Vessels very closely, and, together with them, exactly fills up the Perforations of the Muscles, and so prevents the falling through of the Intestines; to which the erect Posture might render them obnoxious if they were wider, as in Dogs, and some other Animals they are, whose *Horizontal* Posture does not expose them to that danger.

The *Spermatick* Veins take the same Course *Spermatick* with the Arteries, but a little above the *Testicles* *Veins*. they split into several Branches which unite again several times, forming thereby that sort of *Plexus* call'd *Corpus Varicosum Pampiniforme*, or *Pyramidale*. The Blood return'd by these Veins is *Corpus Varicosum Pampiniforme*. deliver'd on the right side to the *Cava*, a little above the *Exit* of the Artery from the *Aorta*, and on the left side into the *Emulgent* Vein, to avoid crossing the great Artery; in its Passage over which, the Blood might be stopp'd by the pulsation of the subjacent Artery, or perhaps the Vein itself be broken. In these Veins are divers *Valves*, as well in the Parts nearer to the *Testicle*, as at their *Exit* into the *Cava*, and left *Ib.* *Emulgent*. *Valves.* *dddd.*

Along with these Vessels, on each side, go *Nerves*. two Branches of *Nerves*, one from the *Plexus* of the *Pelvis*, form'd out of the Branches of the *Intercostals*; the other from the second Pair of the *Vertebræ* of the *Loins*, which latter however is very often not found.

The *Testicles* are soft white Bodies, usually in *Testicles*. Number two, though some have naturally had three,

three, and others but one; *their Figure is oval, and their size about the bigness of a small Pullet's, or large Pigeon's Egg.* They have been thought to have been of a Glandulous Substance, and according to the present prevailing Notion of the Structure of Glands, they may be allow'd to be so still, notwithstanding the Discovery of that inquisitive *Anatomist* Dr. De Graaf, who finds them to be nothing but a Convolution of Vessels of divers kinds, whereof the principal are the Blood-Vessels before described, of which the Arteries bring the Blood from whence the Seed is to be separated, and the Veins return it after that Separation made. The rest of the *Testicle*, which is much the greater part, is made up of Seed-Vessels, which are indeed but one continued Series or Rope intricately convoluted, and wound up as it were into a Bottom, but adhering so laxly, that they are easily drawn out into length; and, in Rats, shaken from their close Contexture, by first separating the *Tunica Albuginea*, and putting the *Testicle* into Water, and then agitating it lightly, these Seminal *Tubuli* will be very manifestly disjoin'd.

How unravell'd in Rats.

App. Tab. xxxiii.

Fig. 2.

No interspersed

Glands to be found.

Some have fancy'd Glands to be necessarily interspers'd for the Separation of the Seed: But no Man has been able yet to demonstrate them, nor does the Necessity appear, if we suppose, as at present many do, that all Glands are but a Convolution of the Sanguineous and Excretory Vessels, though in other Parts their Texture be not so loose, nor their Excretory *Tubules* so conspicuous.

The Epididymidæ. Ib. Fig. 1.

These *Seminal Tubuli*, or Vessels, terminate in the PARASTATES OR EPIDIDYMIDÆ, which are *tuberous varicose Bodies*, lying upon, and adhering to, the upper Part of the TESTES, of which they seem properly a part, tho' of a different Form and Consistence. For tho' the *Parastatæ* be only a various Convolution of the *Seminal Tubuli*, mix'd with

with the Blood-Vessels, as the *Testicles* themselves are, yet here those *Tubuli* being united into one, the various *Convolutions* of which, being more firmly bound together by a strong Membrane arising from the *Tunica Albuginea*, the Body of it feels more compact.

The *Testicles* and *Parastates* are said to be inclos'd in three proper Membranes. It is pretended the first is deriv'd from the *Cremaster* Muscle, which we take to be a needless Multiplication of Membranes; all Muscles, like this, having their proper Membrane, which is all that is meant herein. This *Cremaster* Muscle presenting it self, must be removed before the proper Membrane of this part can be seen: It springs fleshy from the Spine of the *Os Ilium*, and in its descent expands it self on the Surface of the *Tunica Vaginalis*, to which it firmly adheres.

The *Tunica Elytroides*, or *Vaginalis*, is a Continuation of the external *Lamina* of the *Peritonæum*, and is liable to be divided into several Membranes, which some Anatomists please themselves with. It incloses the whole *Testicle*. The third Coat is the *Albuginea*, so call'd from its colour, which is white. It is a strong thick Membrane, very smooth on the outward Surface; the inward, which adheres to the Substance of the *Testicle*, is rough and uneven. Into the upper part of this Membrane are inserted the Blood-Vessels, Nerves, and Lymphatics, which send from thence divers Branches into the Substance of the *Testicle*.

The LYMPHATICKS, which do not appear in the common Dissections, shew themselves pretty plentifully upon this Membrane, if a Ligature be laid upon the *Corpus Varicosum*, of a Dog, or any other live Subject. They go to the common Receptacle of Chyle.

The Scro-
tum.

Mem-
branes.

Dartos.

The Sep-
tum of the
Scrotum.

The Vas
Deferens.
App.
Tab.
xxxii.
Fig. 1.
L L L K.

The Epi-
didymis.

The common *Capsula*, or Membrane, where-
in the *Testicles* are contained, is the SCROTUM.
This consists of two Membranes, the Exterior
being only a Production of the *Cuticula* or *Cutis*,
which is here somewhat thinner than in other
Parts, without any Fat under it. The inner
Membrane, which is call'd *Dartos*, is only an
Expansion of the *Panniculus Carnosus*, which,
together with the *Cutis*, is drawn into the Fi-
gure of a Purse externally. This Purse is, as it
were, divided by a Line which runs longitudi-
nally, and parts it into the right and left side,
and is call'd *the Suture*; answering to this, in-
wardly, is a Membrane which divides the Cavi-
ty just in the same manner, being only a Produ-
ction of the *Dartos*, as the *Mediastinum* is of the
Pleura. It is like that divisible into *Lamellæ*,
and the *Testicles* are on each side loosely con-
nected to it, by means of their outward proper
Tunic. It serves to sustain the *Testes*, and to de-
fend them from Collision against each other, to
prevent their falling down too low, in which it
is auxiliary to the *Cremasters*, and to promote
the Corrugation of the *Scrotum*.

From each *Testicle* proceeds a round hollow
Body, resembling somewhat, in external appear-
ance, a large Nerve, which is call'd VAS DEFE-
RENS OR EJACULANS. It arises from the Ex-
tremity of the *Epididymis*, and is nothing else
but a Production of the Seminal *Tubulus* or Chan-
nel, which is continued from thence to the *Ve-
siculæ Seminales*. It is about the bigness of a
small Goose-Quill, and ascending along with the
Vasa Præparantia, it makes several Serpentine or
Worm-like Turnings and Windings, before it
leaves the Body of the *Testicle*, where it compo-
ses that Body call'd the *Epididymis*, and thence
enters the *Abdomen*, with the afore-mention'd
Vessels, through the Perforations of the Trans-
verse

verse and Oblique Muscles. Having enter'd the *Abdomen*, it is reflected towards the back of the Bladder, and crossing the *Ureter*, grows larger, as it approaches the *Vesiculæ Seminales*; and then again contracting it self just at the *Vesiculæ Seminales*, the two Deferents come together, and seem to pass between them into the *Prostates*, and thro' them into the *Urethra*, without communicating, till then, either with one another, or with the *Vesiculæ Seminales*, or *Prostates*.

It has been a Controversy among the Anatomists, whether the *Vasa Deferentia* had any Communication with the *Vesiculæ Seminales*, or did deposite into them the Seed which they convey'd from the *Testicles*. Dr. Wharton, Swammerdam, Van Horn, and of late Dr. Garth, in his *Lectures* at the College of Physicians, have maintain'd the negative, as others have done the affirmative, whose Reasons for their Opinions we shall take notice of by and by.

The VESICULÆ SEMINALES are two membranous Bladders, situate between the *Vesica Urinaria* about the Neck, and the *Intestinum Rectum*. They are ordinarily three or four Fingers breadth long, and one broad, and about the third part of an Inch thick, though their Dimensions vary very much in the same Subject, according as they are full or empty.

They consist of divers membranous Cells, which are plainly to be seen in a *Vesicula Seminalis*, blown up and dry'd, and afterwards cut. These Cells open one into another, as appears by the ready Communication of the *Flatus*. They are not all of a size, but some are greater, some less, and all are form'd out of the same fibrous Membrane; through the Contraction of which, by the Influx of the Animal Spirits in *Coitu*, some will have the Emission to be occasion'd; though I cannot think the Fibres sufficient for that Purpose.

These

Controversy concerning the Conveyance of the Seed into the Vesiculæ Seminales.

Vesiculæ Seminales App. Tab. xxxiii. Fig. 1, 2.

Cellulæ Vesicularum Seminalium.

Convolutions of the Vesiculæ Seminales.

These *Vesiculæ* appear externally, variously and unequally contorted and convoluted, resembling the irregular Figure of the Intestines of a small Bird, cover'd with a thin Membrane, upon which creep many Branches of Arteries, Veins, Nerves and Lymphaticks.

No Communication between the Vesicles.

From each side they empty themselves, without communicating with each other, into a small Duct, which, about a Finger's breadth below the Neck of the Bladder, is inserted separately into the hinder part of the *Urethra*.

Septum seu Caput Gallinaginis.
Tab. iii.

Between the Mouth of each of these Ducts is a small *Septum* plac'd, to hinder the Seed coming from one side from rushing upon, and so stopping the discharge of the other. This *Septum* is call'd *Caput Gallinaginis*, or *Galli Gallinacei*, and on each side of it, through the fore-mentioned Orifices, the Seed rushes into the *Urethra*.

Carunculae serving as Valves.
Tab. iv.

But lest the Seed should perpetually leak at each Orifice, a *Caruncle*, serving for a *Valve*, is plac'd, which hinders it from ouzing weakly out, but when it is emitted with Vigour, gives way, and, after the Force is over, recovers the Situation again.

The Prostates.

The *Prostates* form a *spongy glandulous Body*, somewhat flattish on its upper Surface, situate just below the Neck of the Vesica, about the bigness of a Walnut. Authors have ascrib'd to it a Substance of two kinds; one *Glandulous*, and the other *Spongy* or *Porous*, which latter seems in reality to be nothing else but a *Congeries* of very minute Vessels, and extremely small membranous Cells: In the middle of those run the Excretory Ducts of the *Vesiculæ*, passing quite through without any Communication. It has Excretory Ducts of its own, pretty numerous. *De Graaf* does not remember to have observ'd them fewer than ten in Men, and in Dogs he has seen

Tab. Ib.
& v.

Their numerous Excretory Ducts.

near

near an hundred. Every one of these discharges it self into the *Urethra*, some above, some below the *Caput Gallinaceum*, but all more laterally than the Orifices of the *Vesiculæ Seminales*, having each of them its proper *Caruncle*. Out of these issues a sort of *Glutinous transparent Liquor*, which some would have to be a third sort of Seed, but in my Opinion serves only to lubricate the Passage of the *Urethra*, and thereby to prevent any Adhesion of the true Seed, which might hinder its being emitted with a sufficient *Impetus*. The *Prostates* are externally cover'd with a fibrous Membrane, somewhat like that of the *Vesiculæ*, and through it are dispers'd the same sort of Vessels, and from the same Parts, as Arteries and Veins from the *Hypogastricks* and *Meseraicks*, and Nerves from the *Plexus* of the *Pelvis*.

Their Liquor no Seed.

Those who with *De Graaf* (which is the greatest part of Anatomists) hold that the *Vesiculæ Seminales* are Receptacles only of Seed, elaborated before in the *Testicles*, and convey'd thither by the *Vasa Deferentia*, are press'd by the Arguments of their Adversaries, who urge that the *Vasa Deferentia* are continu'd down to the *Urethra*, without imparting or receiving any thing by the way; and this they infer from the *Vasa Deferentia* being brought, as it were, below the *Vesiculæ Seminales*, and approaching them only at their Extremity, where whatever they contain should rather, as they think, go out than come in. But this is no conclusive Argument, unless they did prove by an absolute Mechanical Necessity, that no Fluid in an Human Body could enter and come out again at different times, and under a different Force or Pressure, by the same Orifice.

Vesiculæ Seminales the Receptacles only of the Seed.

Argument to the contrary from the Position of the Orifices of the Vasa Deferentia inconclusive.

But, not to answer one Objection with another, which might easily be done, it is plain that the

That Objection answered.

Communica-
tion
between
the Defer-
ents and
Vesiculæ
demon-
strated by
blowing
into the
Deferents.

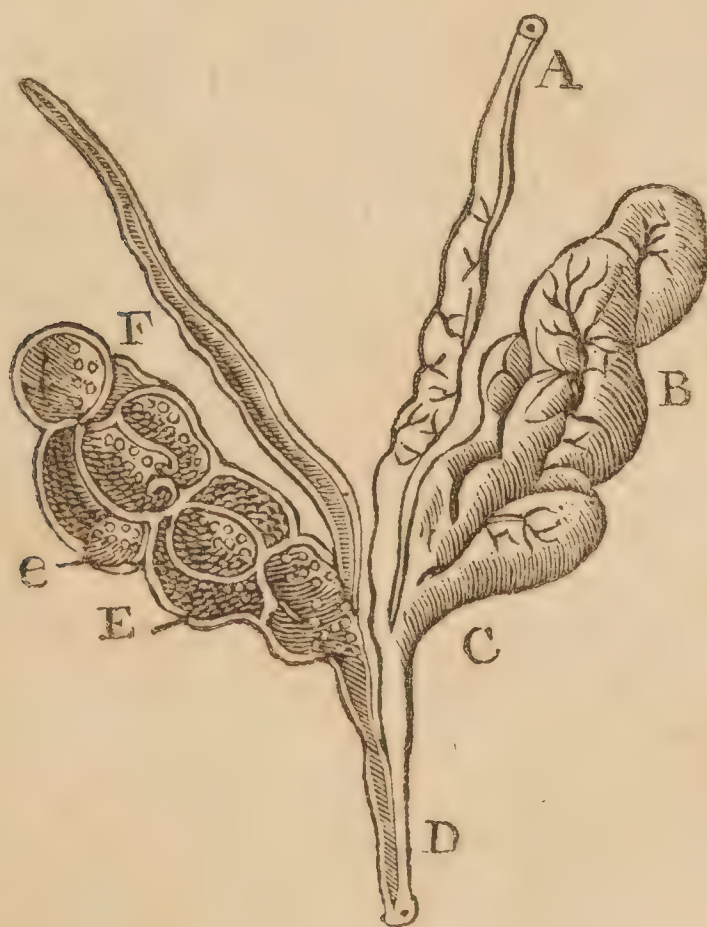
the *Vasa Deferentia*, and *Vesiculæ Seminales*, do communicate one with another, by the ease wherewith the *Flatus* passes from the *Vas Deferens* to the *Vesiculæ* of the same side, and the Facility wherewith it is blown up, or Liquors are injected by a Syringe that way. This proves that there is a Communication in Fact, and it is not sufficient to ask, why Nature should choose to make this Seminal Liquor, as it were, turn back again, to ascend and fill the *Vesiculæ*, rather than to have inserted the *Vas Deferens* into the upper part of it, and so to have fill'd it the more obvious way. For tho' we should confess the reason of such a Procedure to be strange and incomprehensible to us, yet that would not alter the Nature of the Fact. It should, indeed, caution us to be more modest in pronouncing concerning Particulars, whereof we were not sufficiently inform'd, and rather incline us ingenuously to confess our Ignorance, and to wait till time and farther Application, or the Industry of others, shall open to us the Mystery, than, when we cannot discover the real way by which Nature operates, to fall to inventing first the End, and then the Means, which has been an old, but a very disingenuous Method of Philosophizing in Physick.

Manner
of their
Communica-
tion.

But the Difficulty before us is neither so great, nor so puzzling, as to force Men into any such Shifts. For admit that the *Vasa Deferentia* be continued to the *Caruncles* in the *Urethra*, yet if the Neck of the *Vesiculæ Seminales* join them higher, and form together one *Tubulus*, or if it be but inserted into the *Deferens* with a patent Orifice, it is easy and natural to conceive, that the Seed, that is but gently protruded along the *Vas Deferens*, arriving at the *Caruncle*, should there be stopp'd, and the Protrusion still continuing, should rather deflect laterally into the *Vesicula*, which is open, altho' that may be call'd,
in

in some measure, remounting, than force the Obstacle of the *Caruncle*, whose resistance is greater than that of the Weight of so much Seed as one of these Deferents will contain.

This is so far from being hard to be conceiv'd, *Illustrated by the Descent of Water in a forked Tube.* that it is the constant and regular Course of all Fluids in such Cases. For Example: Let us suppose a *Tube*, form'd in the Figure of a Y, or, which is all one, of the *Vesicula Seminalis* on the Left side, here figur'd.



A, The Left Vas Deferens.

B, The Left Vesicula Seminalis.

C, The Place of their Communication, at which the Seed is reflected into the Vesicle.

D, Their common Orifice

clos'd by a Caruncle instead of a Valve.

F, The Right Vas Deferens cut through, after having been inflated and dried.

E e, The Cells of the Vesicula Seminalis, as they appear in that State.

If you pour Water into A, it will readily descend to D; but if at D there be a *Valve* placed, which

which neither the Weight of the Water, nor the force of its Direction, are able to overcome the Resistance of, then the Water will deflect at C, and rise up into B.

*The Mechanism
simple, and
easy of
Concep-
tion.*

This simple Piece of Mechanism is what so many ingenious Men have stumbled at, and thought themselves obliged to suppose several sorts of Seed to be form'd in these uncommunicating Parts: A trouble certainly they would not have put themselves to, if they had observ'd how easily the *Flatus* passes in a Body recently dead. But perhaps the ill Success of this Experiment, try'd upon a stale Body, when the Membranes were cold and stiff, and the Parts collaps'd and cohering, made these learned Persons maintain, that there was no Communication.

*Doctrine
of the se-
veral sorts
of Seed,
why taken
up of late.*

We shall not spend any time in refuting that Doctrine of three sorts of Seed, because it was apparently taken up to avoid this Difficulty. The *Seed* of the *Testicles*, and *Vesiculæ Seminales*, appear manifestly the same, and nothing was wanting to make them be allowed so, but to prove the Communication. The *prostatæ* Liquor is by most acknowledg'd not to be *true Seed*, no more than that which is emitted by Women: Nor is there any good Reason, why any Body should call it so, the Appearance being so very different, and another sufficient Use found.

*Glans of
the Vesi-
culæ, se-
parate no
Seed.*

The learned Dr. *Wharton's* ground, of imagining a peculiar sort of *Seed* to be separated in the *Vesiculæ*, (which was his Observation of a great many *Glandules* in them, which he suspected to be the Organs through which the *Seed* was separated,) would have been more material than the former, if those *Glands* which he mentions had been considerable for their Number or Magnitude. But they are so far from being sufficient for that Office, that they are not conspicuous, and by most other Anatomists have been unobserv'd.

unobserv'd. *De Graaf*, who sought for them, expressly denies their Existence. It seems therefore unreasonable to assign that Office to them, whilst their Existence is controverted.

However, it is not improbable that the *Vesiculae Seminales* may be furnish'd with Glands, as the *Vesicula Fellea*, and *Urinaria* are. But then we cannot assign them any other use than those Glands have in their respective Parts, that is, to afford a Mucous Lining, with this Difference, that it is not to protect the Membrane from any Acrimony of the *Seed*, but to lubricate it, and facilitate the Expression of it, lest it should otherwise adhere to the inside of the Membrane, as all Viscous Fluids are apt to do to the sides of a dry Vessel.

Probable use of those Glands.

C H A P. XX.

Of the Penis.

THE CUTICULA of the PENIS, differs not from that of other Parts, unless on the Glands, where it is very delicate and thin, and appears to have a smooth Surface, not rough and squamous, as that of other Parts when view'd with magnifying Glasses.

The Cuticula.

The Skin itself is not so thick as 'tis generally found on other Parts. The doubling of it on the *Glans* makes the *Præputium*. Nature does not seem more wanton in any part of her Works than in this, especially the *Præpuce*, for the Figure and Proportion of which I can scarce find any Standard. From hence, perhaps, arose the Necessity of *Circumcision*, so generally practis'd in all the Oriental Parts, as well as among the *Jews* to this Day. The first of which use it out of Cleanliness, and to prevent Diseases, which

The Cutis or Skin.

Tab. iv.

A A.

The Præpuce.

ib. a a.

the

the Detention of the *Mucus* of the *Subpræputial Glans* might breed in those hot Countries. For even here I have seen some, who having large *Præpuces*, such as they call *Filberd Præpuces*, who have been frightened at the odd Appearance of that *Mucus* ouzing out, upon mere Plenitude, from between the *Præpuce* and *Glans*. Perhaps the great Lawgiver of the *Jews* had a regard to this Convenience, in the first Institution of *Circumcision*: For we still meet with a great many Instances, where that Operation, or something like it is necessary. It is tyed to the lower part of the *Glans*, by a Ligament call'd the *Frænum*. In this also Nature varies; for 'tis often so short, that, unless it be divided, it will not admit of perfect *Erections*.

The Liga-
ment of
the Penis.
The Fræ-
num.
Tab. vii. a.

Glans
under the
Præpuce.
Tab. iii.
a b
Use of the
Liquor
they sepa-
rate.

Causes of
the Con-
traction of
the Præ-
puce.

Ligamen-
tum Sus-
pensori-
um Penis.
Tab. II.
Fig. I. y.

At the Connexion of the other part of the internal Skin of the *Præputium*, are divers oval and roundish little *Glandules* placed irregularly, and that not only in the Neck, or joining of the *Glans* to the *Corpora Cavernosa*, but on the *Glans* it self. By these *Glandules* is separated that Liquor that renders the Agitation of the *Præputium* on the *Glans* easy; when this Liquor becomes rancid, as it does in old People, and in *Venereal* Contacts, it excoriates the *Glans* and *Præputium*, and very often exulcerates, and renders the *Præpuce* liable to contract, and obliges the Patient to have it divided. The Extremity of the *Præpuce* is apt to grow so streight in old Men, that they cannot bare the *Glans*, perhaps through the Defect of frequent *Erections*.

The other Ligament belonging to the *Penis* is call'd *Suspensorium*, from its Office, in holding up the *Penis* to the *Ossa Pubis*. It arises from the fore-parts of those Bones, and becoming thicker, divides for a Passage to the great Vein of the *Penis*, and is fasten'd to the upper parts of the *Corpora Cavernosa Penis*, on each side the great Vein of the *Penis*.

The

The *Penis* is naturally destitute of *Fat*, and *No Fat on* when it happens to have any (as there are In-^{the Penis.}stances) it is a Disease, and incommodes it in the execution of its Office. In Children you will commonly find *Fat* on the *Penis*, but in grown Bodies 'tis seldom found, tho' the Membranes between the Skin and *Corpora Cavernosa* remain, and it's not improbable, that frequent Erections may prevent their Cells being charg'd with the Oil which composes the *Fat*, as appears by the Microscope. This want of *Fat* makes the Skin of this part very loose and distensible, and the Membranous Body between the Skin and *Corpora Cavernosa* divisible into several Coats, as appears when this part becomes affected in an *Anasarca*, in which the Membranes of this part, and the *Scrotum*, have been found thickned to more than three or four Inches. The external Teguments removed, the Body of the *Penis* offers itself; First,

The two *Corpora Cavernosa*, and the *Corpus Corpora Cavernosum Urethræ*, and their Vessels, frame the *Body of the Penis*. The two Cavernous Bodies, ^{Corpora Cavernosa Penis. Tab. iii. P, P, A, D.} by some call'd *Corpora Nervosa, Spongiosa, &c.* have two distinct beginnings from the lower sides of the *Ossa Pubis*, where they are smallest, which soon growing large and thick, join to each other, where they meet with the Cavernous Body of the *Urethra*, for which they leave an Interstice, or Channel, in their lower side, wherein is receiv'd the Cavernous Substance of the *Urethra*. The superior Surface of those Cavernous Bodies have a small Interstice, or Channel, also near the *Pubes*, in which the *Vena Penis* is lodg'd: Both these join by the Intervention only of a *Septum*: ^{Their Septum. Tab. iv. Fig. ii. A A.} This, towards the Back or upper part of the *Penis*, is very thick and strong, and seems to be compos'd of the two outward thick Membranes, or Cases of the *Corpora Cavernosa* join'd to each other;

other : The other Extremities of the two *Corpora Cavernosa* are capp'd with the *Glands*.

The Cor-
pus Ca-
vernorum
Urethrae.
Tab. iv.
Fig. i.
L, M, N,
O, Q.

The third Cavernous Body of this part is call'd *Corpus Cavernosum Urethrae*, because the *Urethra*, or Passage of Urine in the *Penis*, is inclos'd with it. Its External Figure differs very much from that of the two *Corpora Cavernosa* ; for whereas they are lessen'd at their two Extremities, this is there largest, and lessen'd in its middle. Its upper part, that is placed between the two beginnings of the *Corpora Cavernosa* before they unite, I call, after Mr. Cowper, its *Bulb*, from its Figure, which is large, thick, and round, not unlike a Clove of Garlick, or an Onion. Its external Membrane is here very thin, and it is divided according to its length, by a *Septum* that is thickest toward the *Urethra*, which is not encompass'd with this Cavernous Body, till it passes under the two *Corpora Cavernosa* at their meeting. This Bulbous Part of the *Corpus Cavernosum Urethrae* is plac'd in that Part call'd *Perinæum*, which is between the *Scrotum* and *Anus*, and is cut through to come at the *Urethra*, in the Operation of cutting for the Stone in the Bladder : It is cover'd with the *Musculus Accelerator Urinae*, of which elsewhere. The middle Part of this *Corpus Cavernosum Urethrae* is almost Cylindrical, but the Passage for the Urine is not thro' its Center, but inclines to its upper part next the Body of the *Penis*.

Bulbus.
Urethrae.
Tab. v.
Fig. i. I.

Septum
Bulbi.
Tab. vii.
Fig. iii.
a a.

Cut thro'
in cutting
for the
Stone.

The Glans
Tab. iv.
Fig. i.
N, O, Q.

The other Extremity of this *Corpus Cavernosum Urethrae* is again dilated, and makes that Body, call'd the *Glans* ; its external Figure is well known ; it receives the Extremities of the *Corpora Cavernosa Penis*, in a Cavity or Depressure of it. Its internal reticular Substance is closer than that of the *Penis*. The Symmetry of these Parts being known, we come next to treat of their Vessels and internal Structure. First of

The

The *Arteries*, which arise sometimes from the *Arteries* internal *Iliac* Branches, but most commonly from *of the Penis*. the lower parts of the *Umbilical Arteries*; whence *Tab. vi.* it is, perhaps, that this part is less than usual, by *Fig. i.* tying the Navel-string too close, not only by the *G, G.* Retraction of the *Urachus*, thro' its Continuity with the Bladder, and consequently the *Penis*; but the *Arteries* of the *Penis*, springing from the *Umbilical*, are liable to Coarctation, if they are over-extended, whereby the requisite Plenty of influent Blood is denied the *Penis*: Before these *Arteries* reach the *Penis*, they commonly send out two or three Branches on each side, the two inferior of which carry Blood to the *Musculi Directores Penis*. *Musculi* The two superior convey Blood to the adjacent *Directores* Parts, particularly to the *Musculi Levatores Ani*, *Penis.* between which, and the *Musculi Marsupiales Femorum*, these great Trunks pass; but marching over the Cavernous Bodies of the *Penis*, they are both subdivided into two large Branches, the two inferior of which *ii* pass to the Bulb of the *Ib.* Cavernous Body of the *Urethra*, but the two superior *kk* are both subdivided again; the external *dd* running on the superior Surface of the *Ib.* Cavernous Bodies of the *Penis*, the internal *ll* entering their *Capsulae*, pass through the middle *Ib.* of each Cavernous Body *DD*, wherein they divide into innumerable Branches, from whose *Ib.* Capillary Extremities are continued so many *Fig. ii.* Veins, in the Channels of which are divers Apertures into as many Cells *D*, that communicate with each other, that empty themselves into larger Venous Ducts *C*, running on the superior *Tab. iii.* Surface of the *Penis*, some of which join with the Veins of the *Prepuce* *d*, others make one *Ib.* large Trunk, which is call'd *Vena Penis* *M*, marching on the *Dorsum Penis*, immediately under the Ligament, that ties the *Ossa Pubis* together internally; by which Ligament the Vein is *K 2* compress'd

compress'd in an Erection, as shall be shewn by and by ; but this Vein proceeding farther on the *Prostatæ*, it is there divided, and enters the internal *Iliac Veins* on each side. The Veins, which arise in like manner from the *Corpus Cavernosum Urethræ*, pass from its Bulb through the *Musculi Acceleratores C C*, and are compress'd by those Muscles.

Tab. vii.
Fig. i.
Nerves.

Tab. vi.
Fig. i.
H, H.

The Nerves spring from a Trunk composed by the *Coalescence* of the third of the *Os Sacrum*, and a Branch remitted from the great Crural Nerve, which, after their Union, provide Nerves for the *Testes*, *Perinæum*, and Muscles of this part ; which ascending on the Cavernous Bodies of the *Penis*, expand themselves on its upper Surface cc, and are afterwards distributed to all the parts of the *Penis*.

Ib.

Lymphæ-
ducts,
Ib. L. L.

Tab. vii.
Fig. v.

*Discharge
themselves
into the
Inguinal
Glands.*

*The Cause
of Buboes.*

The *Lymphæducts* of the *Penis*, are very numerous on its Surface under the Skin, in that loose Membrane that is in the place of the *Membrana Adiposa*. If you blow into the *Veins* of a *Dog's Penis*, its *Lymphæducts* will be inflated after its *Cavernous Body* is extended : These, like the *Lymphæducts* of the lower Parts, discharge their *Lympha* into the *Glandulæ Inguinales* : Hence, perhaps, the morbid Matter in *Claps* is transferr'd into these *Glands*, and causes those *Tumours*, call'd *Buboes*, from the *Glands* called *Bubones*. On this account the opening these *Tumours*, before the usual time for *Suppuration* in other *Tumours*, appears necessary, lest the peccant Matter be convey'd by the exporting *Lymphæducts* of those *Glands* into the Mass of Blood, of which we meet with too many Instances.

*Exact Re-
semblance
of the
Structure
of the
Spleen.*

The Internal Structure of the *CORPORA CAVERNOSA*, agrees exactly with that of the *Spleen*. The *Arteries* of the *Penis*, after they enter its *Corpora Cavernosa*, are distributed into its *Reticular Substance*, which are chiefly compos'd of

Membranous

Membranous Filaments, deriv'd from the *Capsulæ Filaments*, or sides of the *Corpora Cavernosa*, or their *Septa* : ^{Ib.}
 These *Filaments* are variously intertext with (as ^{Fig. iv.} they pass from the sides of the *Corpora Cavernosa*,) and support the Ramifications of the Blood-Vessels and Nerves. These Veins of the *Corpora Cavernosa* do not pass from it, as they commonly ^{The Sub-} do from other parts in particular Channels, but ^{stance of} their sides are here punch'd with numerous holes, ^{the Caver-} that open into this *Cavernulous Substance*, which ^{nous Bo-} have such Communications, as that if you blow into either beginning of the *Corpora Cavernosa*, they both are readily distended ; but the *Corpus Cavernosum Urethræ* will not be affected, tho' the other two are distended with Wind, unless in some Subjects (which is very rare) in whom the Veins happen to let the Wind pass from the *Cavernous Bodies* of the *Penis*, to that of the *Urethra*. From this Structure of the *Penis*, we may be inform'd of the particular Use of its Parts.

This Structure shews that the *Penis* is strictly ^{Office of} an Organ of Generation only, and that the con- ^{the Penis.}veyance of Urine was not consider'd by Nature in this Mechanism, that being as well answer'd in Birds, Women, and all Female Creatures another way. But an Incitement to the Propagation of their Species had perhaps been wanting, but for this Organ ; tho' the way of Propagation in most kinds of Fishes seems to argue the contrary. But of that we shall have occasion to speak more at large hereafter. At present it may suffice, that without such an Instrument, the Seed of the most perfect Animals could not be convey'd to the place of Prolification : And that an Alternation, as occasion requires, of Erection and Flaccidity, was absolutely necessary, the first, to the Performance of its Office, the latter, for the Security of the Part : Since without an Erection it were impossible to emit, and lodge the Seed where

it ought to be ; and with a constant one, almost as impossible to secure the Part from many of those Injuries to which it would be perpetually exposed ; not to mention the Loss of Instigation, which must be a necessary Consequence of constant Erection.

Penis,
how erect-
ed.

That the Blood is the Matter which distends the *Corpora Cavernosa Penis* in an Erection, is manifest from abundance of Experiments, tho' the most certain is that of firmly tying the *Penis* of any Animal, (as has been done frequently to a Dog,) in *Coitu*, in which nothing but Blood has been found that distended it. In the Bodies of Criminals, that hang long after Death, the *Penis* becomes erected, the Blood, in that Position, falling to the inferior Parts and stopping there. By blowing into the Blood-Vessels after Death, the *Penis* becomes erected.

The Blood
by what
means
detain'd.

This was first observ'd by the Accurate Mr. Cowper, upon viewing its Veins, after he had distended them with Wind, whence it was very plain, that the External Trunks pass'd some under its Skin only, and some over the *Ossa Pubis*, which for distinction, he call'd *Venæ Præputii*. Besides these, a vast number of Veins (on the *Dorsum Penis*) unite, and empty themselves into one Trunk call'd *Vena Penis*, which passes immediately under a Transverse Ligament of the *Ossa Pubis*, and is compress'd by the Approximation of the *Dorsum Penis*, to the Ligament of the *Pubis*. This Application of the *Dorsum Penis* is effected by its *Musculi Directores*, pulling down the *Crura* of the *Corpora Cavernosa Penis*, which are ty'd up at their Junction in the Body of the *Penis*, to the *Ossa Pubis*, by the *Ligamentum Suspensorium* above-mention'd.

Corpus
Caverno-
sum Ure-
thræ, how
erected.

This cannot happen to the *Cavernous* Body of the *Urethra*, because there is no Bone, whose Position (in Human Bodies, and most *Quadrupeds*)

can

can give rise to a *Ligament*, which can have that effect on its Veins. Wherefore the *Musculi Acceleratores*, embracing the Veins of the *Bulb*, do that Office, tho' not so effectually as in the *Penis* it self; whence it is that the *Glans* is not always perfectly distended with the *Penis*, and soonest becomes flaccid on an *Erection*.

The Blood, by these means, being hindered in its return, the *Corpora Cavernosa* must necessarily be distended, if we consider the Structure of them above-mentioned, with respect to the Veins. The Arteries, which before were flaccid, have now their Trunks also extended, and do more plentifully import Blood into the *Corpora Cavernosa*. But since it is absolutely necessary, some part of the detain'd Blood should be still passing off, lest it becomes Grumous and unfit for a Reflex, the *Venæ Præputii* communicate with those of the *Penis* it self, as before observed; whereby part of the Blood may be return'd from the *Penis* during its *Erection*, and give way to a fresh supply from the Arteries, and preserve the Circulation in it uninterrupted. By this we are taught how to relieve an obstinate *Priapism*, by opening the Vein of the *Penis*.

This admirable Contrivance, in disposing these *Exporting Sanguiferous Ducts*, so that some are compress'd, whilst others remain altogether free and open, is not only seen in the *Penis* of Men, and *Pudenda* of Women, but in those parts of all other Animals, that have fallen under our Examination; with some difference of Instruments only, in some particular Creatures; as Mr. Cowper has instanced in the Male *Opossum*, *In the Philosophical Transactions*, N°. 290. P. 1584. *Opossum*. This Retardation of the Refluent Blood, is chiefly continued by means of a Sphincter Muscle. In a Male *Porpoise*, long since dissected by Mr. Cowper, were found two Bones, with their Ligaments, *In the Porpoise*.

In Dogs.

ments, framed on purpose for this end. In a Dog he some time since observed likewise, a *Digastrick Muscle*, whose middle Tendon pass'd transversely on the Veins of that Animal's *Penis*, which seem'd to be provided by Nature, that when in *Coitu*, tho' the Dog is turn'd off the Back of the Bitch, and his *Penis* drawn off from the *Ossa Pubis*, which, without that Transverse Muscle, would make way for the Blood to pass off, and let its *Bulb*, by which the Dog is ty'd to the Bitch, grow flaccid.

Muscles
of the
Penis.

Tab. vii.

Fig. i. CC.

Tab. v.

Fig. i. L.

Accelerator
Urinæ.

The Muscles of the *Penis* are two Pair; and one odd Musele; the first, that offers it self in Dissection, is the *ACCELERATOR URINÆ*, which appears on dividing the Skin and Fat in the *Perinæum*. 'Tis often join'd with the *Sphincter Ani*. It arises *Tendinous*, but soon grows fleshy, from the upper and fore-part of the *Urethra*, as it passes under the *Os Pubis*; its fleshy part encompassing the *Bulb* of the *Corpus Cavernosum Urethræ*; Both sides of this Muscle meet in a middle Line, corresponding to the Seam in the Skin over it: It continues so united about two Inches in length, then detaches two Fleshy Elongations c c, which become thin Tendons, at their Terminations on the *Corpora Cavernosa Penis*. This is commonly made a Pair of Muscles, but in truth is but One Muscle. Its upper part, that covers the *Bulb*, when in Action, streightens the Veins that pass through it from the *Corpus Cavernosum Urethræ*, and hinders the Reflux of the Blood in an Erection of the *Penis*, and by the repeated Contractions of this upper part, drives the Blood in the *Bulb* towards the *Glans*: The two Elongations, that part on the *Urethra*, and ascend to their Terminations on the *Corpora Cavernosa Penis*, so compress its Channel, as to force out the contain'd Seed or Urine, from which latter Use it has its Name.

Tab. vii.

The

The *Erectores Penis*, so call'd from their use, spring Flefhy each from the *Os Ischium*, below the beginning of the *Cavernous Body* of the *Penis* on the fame fide, and after an oblique Progress, end partly Tendinous, and partly Flefhy, in the beginning of that *Cavernous Body*. When these act, the *Penis* is drawn to the *Pubes*, and by means of the *Ligamentum Suspensorium Penis*, its great Vein is apply'd to the transverse Ligament of the *Ossa Pubis*, and the refluent Blood hindred from passing that way, whereby its *Corpora Cavernosa* become distended. The last Pair of Muscles that belong to the *Penis*, are call'd from their Position,

*Erectores
Penis.
Tab. ib.
Fig. ib.
F. G.*

Transversales Penis. These are often wanting, and frequently vary in different Subjects: Sometimes they are derived from the *Sphincter Ani*, and terminate in the *Bulb* of the *Cavernous Body* of the *Urethra*. At other times you'll meet with a Muscle on one side only: But ordinarily they arise from the *Ischium* near the former, and are inserted on both sides the *Corpus Cavernosum Urethræ*, immediately below its *Bulb*. When they act, they dilate either the *Bulb*, or that part of the *Corpus Cavernosum Urethræ*, to which they are fasten'd.

*Transversales
Penis.
Tab. v.
Fig. i.
K K.*

There remain yet to be accounted for Three GLANDS discover'd by * Mr. Cowper, and not yet taken notice of by any other Anatomist. They all empty themselves into the *Urethra*, and are by Mr. Cowper, from the Tenacity of the Liquor which they separate, call'd the Mucous GLANDS of the *Urethra*. The two first discover'd of these are about the bigness of a French Bean, of a depress'd Oval Figure, of a yellowish colour like the *Prostates*, and lie on each side the *Bulb* of the *Cavernous Body* of the *Urethra*, a little above it G G. Their *Excretory Ducts* spring from their Internal Surface A b, next the

*Tab. vii.
Fig. i. EE*

*Mr. Cow-
per's Mu-
cous
Glands of
the Ure-
thra.
* Philos.
Transf.
Nº. 258.
November
1699.*

*Tab. v.
Fig. i.
Ib.*

Fig. ii.
Ib.

the Inner Membrane of the *Urethra* C, whence descending about half an Inch, they begin to grow less, and piercing that Membrane obliquely, open into the *Urethra* at D, by two distinct Orifices just below its bending, under the *Ossa Pubis in Perinæo*, where they discharge a *Transparent Viscous Liquor*.

Mr. Cow-
per's
Third
Mucous
Gland of
the Ure-
thra.

Besides this Pair, there is a third Mucous GLAND, discover'd likewise by the same Mr. Cowper, to whose happy Sagacity, Industry, and Communicative Temper, the Inquisitive into this part of Knowledge are infinitely indebted. This is describ'd by him in the *Appendix* to his *Euxæstia*, and is a small conglobate yellowish Gland like the former, but somewhat less. It is situate about the Angle of Flexure of the *Urethra*, under the *Ossa Pubis* in the *Perinæum* near the *Anus* F, as it was drawn from a Preparation, which Mr. Cowper has still by him. To find this Gland, the *Corpus Cavernosum Urethræ* must be divided lengthways to the Inner Membrane of the *Urethra*, which must be cautiously freed from the Body; which done, the Gland will appear in the Place already mentioned. It has two *Excretory Ducts*, which enter the *Urethra* obliquely about a quarter of an Inch below the Orifices of the two former K, and discharge a Liquor like theirs both in Colour and Consistence.

Tab. iv.
Fig. ii.

Tab. ib.
Fig. i.

Where the
Excreto-
ry Duct
of the
Right side
only is ex-
press'd.

Mr. Cowper, who is always ingenious, and generally right in his Conjectures about Anatomical Matters, thinks there may be two Uses of this *Mucus*. The First, to hinder any Remains of Urine from mixing with the *Semen*, in the *Urethra tempore Coitus*, which I can find no reason to expect there at that time. Yet I must subscribe to his Opinion, that the main Design of Nature, in framing these Glands, seem to respect the Grand Work of Generation. For by their Situation, they must necessarily be compress'd upon

Erecti-

Erection, and consequently discharge their Contents before the *Testes* and *Vesiculæ Seminales*, which are not subject to so immediate a Force. I apprehend therefore, that their *Mucus* serves to lubricate the Pipe of the *Urethra*, and thereby to facilitate the Emission of the *Semen*, and render it more Vigorous and Projectile, than otherwise it could probably be, if so viscid a Liquor, as the *Semen*, were to pass through a Channel absolutely dry, to which it would be apt to adhere, and so its Projection be obstructed.

Much less can I think, that they were by Nature contriv'd to defend by the *Mucus*, which they afford, the *Urethra* from the Acrimony of the *Urinous* Salts. For to answer that end, the *Urethra* should be constantly lin'd with it, and the Discharge continual, as it is in a *Gleet*, when the *Caruncula*, which closes the *Excretory Duct* of any of these Glands, happens to be eroded, as we observ'd it once in a Servant of mine ; of which Mr. Cowper has given us the History, and the Figure, in his Description of these Glands, publish'd before his *Εὐχαιρία*, both which I have thought worth the transferring hither. But as these Glands do not emit their Liquor *in Statu Sano*, but upon Compression, which cannot happen but in Erection, and that a pretty stiff one too, by reason the Resistance of the Caruncle must be forc'd, it is not probable, that this Liquor should be always discharg'd previous to the Urine, which is as often made with a *Flaccid Penis* as otherwise. Nor indeed do I see any need to hunt for any other Use, than that which I have assign'd in the preceding Paragraph.

Mr. Cowper having, with his Description of the first discover'd Pair of the Glands, hinted his Suspicion, that an inveterate * GLEET might proceed from a Venereal Ulcer happening upon the *Ostium* of either of these, whence, if an ab-

Cause of
Invete-
rate

Gleets.

* Philos.

Transf.

Novem-

ber 1699.

solute Erosion of the Caruncle ensued, an Incurable Gleet might follow; an opportunity presented it self to me, to examine into the certainty of that Opinion, in a Servant of mine who died of a *Peripneumony*, but had been some Years troubled with an obstinate Gleet. In this Subject we found that the Caruncle, which should have clos'd the *Duct* of the *Mucous Gland* on the Left side, had been eroded by an Ulcer, and the Orifice of that, and of the Left *Duct* of the single *Mucous Gland*, laid into one, as appears by Tab. IV. Fig. I. (*) drawn from it by Mr. Cowper. Hence proceeded an almost constant Dripping of a Diaphanous Viscid Ropy Liquor, such as these Glands furnish, which is what we call a Gleet, and must necessarily happen to all Persons under the like Circumstances.

What a
Clap is.

He that considers, that a Clap is nothing but an Ulcer rais'd in the *Urethra*, by the Insinuation of some *Virulent*, or to speak more properly, *Acrimonious* Purulent Matter into it, will not wonder, that it should often hang and fix its Seat at the *Ostiola* of these *Excretory Ducts*. But of these Matters I shall take another Occasion to speak more largely.

T A B. III.

THE Fore-parts of the Bladder of Urine, and *Corpora Cavernosa Penis*, &c. somewhat less than the Life.

A A, The whole *Corpora Cavernosa Penis*.

a a, Their Extremities which are capp'd with the *Corpus Cavernosum Glandis Penis*.

B, The Skin of the *Penis*, which makes the *Præputium*.

h, Its Duplicature or in-

ternal Surface, that is continu'd to the Glans.

CD, The Blood-Vessels on the *Dorsum Penis*, fill'd with Wax.

c c, Their Trunks cut from the Glans.

d, A Trunk of the Vein that receives Branches from the *Præpuce*, by which the Wax was injected, to fill the Veins at M D C.

E, The *Glans Penis* fill'd with Wax, by the Vein.

e, A Por-



e, A Portion of the *Ura-
chus*.

F, the Fore-part of the
Bladder of Urine.

f, Its inward *Nervous
Membrane*, through which
the order of *Muscular Fibres*
may be seen.

g g, The two Orifices of
the *Ureters*, as they open in-
to the Bladder.

h, The small Glands,
which may be seen by the
naked Eye, between the two
Orifices above mentioned,
that separate the *Mucus*,
which defends this Internal
Membrane of the Bladder,
from the Salts of the U-
rine.

G G, The *Ureters* cut off.

H H, Portions of the
Vasa Differentia.

I I. Parts of the *Vesiculæ
Seminales*.

K K, The Fore-part of
the *Prostates*, which are
here divided, together with
the *Urethra*.

L, The *Caruncle*, or *Ca-
put Gallinaginis*, which hin-
ders the Seed from perpe-
tually leaking at the two O-
rifices on each side of it here
mark'd o o.

ii, The Mouths of the
Excretory Ducts of the *Pro-
states*, on each side the *Ca-
put Gallinaginis*.

M, That part of the Vein
of the *Penis*, that is com-
press'd by the Ligament of
the *Pubis*, in an Erection.

NN. The
Arteries } on the *Dor-
sum Penis*.
OO. The }
Nerves }

PP, The beginnings of
the *Corpora Caverosa Pe-
nis*, cut from the *Ossa Pu-
bis*.

QQ. The *Musculi Di-
rectores Penis*.

RR, The *Urethra* divid-
ed and expanded.

S, The *Mucous Gland* of
the Right Side pinned out.

t, The Orifice of its *Ex-
cretory Duct*, as it appeared
with its *Mucus* in it, ready
to be discharged.

r, The Mouth of the *Ex-
cretory Duct* of the Left *Mu-
cous Gland*, which was very
open in this Subject, being
in common with another
Mucous Gland of the same
side, express'd in the follow-
ing Table, Fig. i. *. and
Fig. ii. F.

T A B. IV.

F I G. I.

THE Fore-part of the
Urethra open'd, to
shew the Orifices of the *Ex-
cretory Ducts* of the *Mucous
Glands*, somewhat less than
the Life.

A A A, The inside of part
of the Bladder of Urine.

B, A Probe in the Left
Ureter, to shew its entrance
into the Bladder of Urine.

C, The Right *Ureter*,
whose lower part is slit o-
pen, to shew its Oblique In-
sertion between the *Mem-
branes* of the Bladder, before
it

it opens into its Cavity.

D, The Miliary Glands of the Bladder.

E E, Parts of the *Vesiculæ Seminales*.

e, The Blood-Vessels, which are distributed on the *Vesiculæ Seminales*, and lower parts of the *Vasa Deferentia*.

F F, The *Prostates* divided and open'd.

fff, The sides of the *Urethra* divided and pinn'd out.

G, The *Caruncle* or *Caput Gallinaginis*, with the Mouths of the *Excretory Ducts* of the *Prostates* on each side, as in the preceding Table i, L.

H H, The two first and largest *Mucous Glands* pinn'd out.

I I, Two Probes in their *Excretory Ducts*, of which, the Orifice of the Right side is in its Natural State.

(*) The other * was in-

larged in this Subject by an Ulcer.

K, A small Probe in the *Excretory Duct* of the lower and lesser *Mucous Gland*, vid. Fig. ii. F.

L, The *Bulb* of the *Cavernous Body* of the *Urethra* fill'd with Wax.

M M, The sides of that *Cavernous Body* fill'd with Wax, and divided according to its length, to shew its inside.

N, The *Glans Penis* fill'd with Wax, from the Vein mark'd d, in the preceding Figure.

O, The Cavity fram'd in the *Corpus Cavernosum Glans Penis*, in which the Extremities of the *Corpora Cavernosa Penis*, of the foregoing Figure mark'd a a a, are receiv'd.

Q. The upper part of the *Glans* next the *Penis*.

P, Part of the *Membrana Carnosa Penis* pinn'd down.

F I G. II.

PArt of the Bladder of *Urine* and *Urethra* of a Boy inflated.

A, The lower and hinder part of the Bladder of *Urine*.

b B, The *Vesiculæ Seminales* blown up by

CC, The *Vasa Deferentia*.

D, The *Prostates*.

E E, The *Urethra* clear'd from its *Cavernous Body*.

F, The lesser *Mucous Glands* plac'd at the Angle, or turning of the *Urethra* under the *Ossa Pubis*.

T A B.

Fig: 1.



Fig: 2.

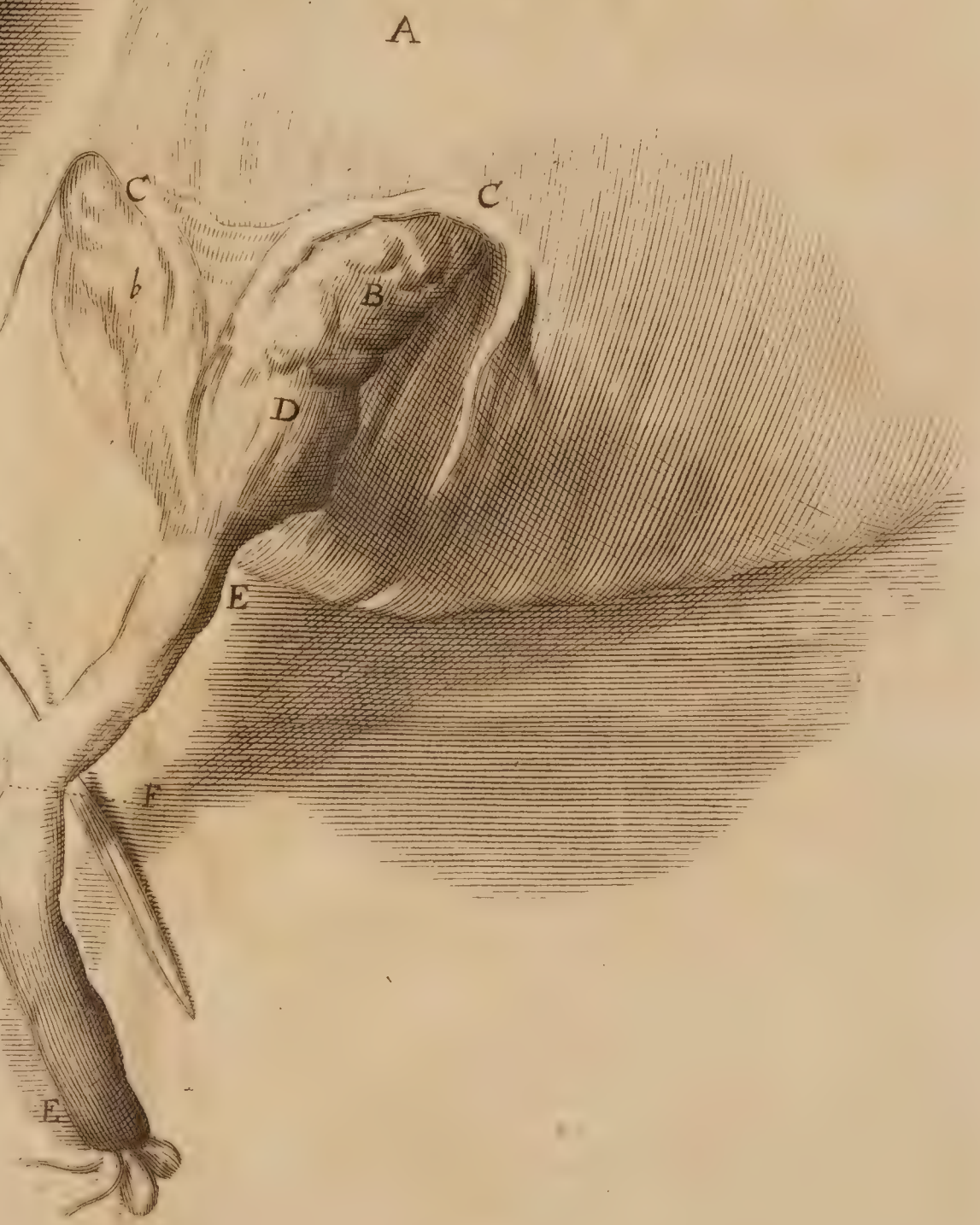
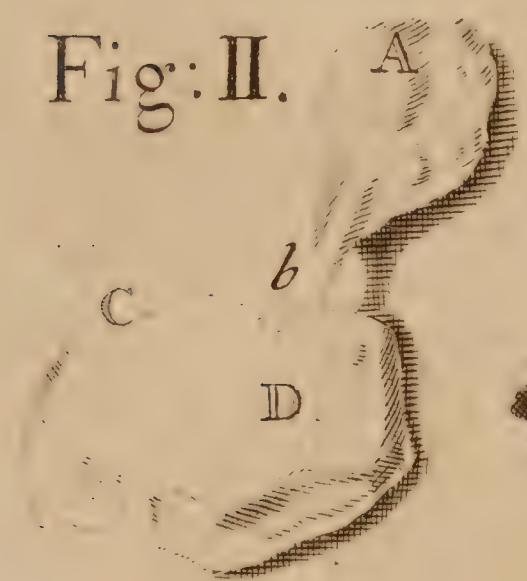


Fig:I.



Fig:II.



T A B. V.

F I G. I.

A, **A** Portion of the Bladder of Urine.

B B, Parts of the Ureters.

C C, Parts of the *Vasa Deferentia*.

D D, The *Vesiculæ Seminales* somewhat distended with Wind, by blowing into the *Vasa Deferentia*.

a a, 'The Blood-Vessels of the *Vesiculæ Seminales*.

E, The *Glandulæ Prostatæ*.

F, The *Urethra* expanded after opening its superior and fore part to see the *Ostiola* of the *Excretory Ducts* of the following Glands.

G G, The two Glands above described, which from the Liquor they separate, (are call'd by Mr. Cowper, who discover'd them) *Glandulæ Mucosæ*.

h, The *Excretory Duct* of one of the last mention'd Glands, before it passes under the *Bulb* of the *Cavernous Body* of the *Urethra*.

I, The *Bulb* of the *Cavernous Body* of the *Urethra*, partly distended with Wind, and divested of the *Accelerator*

Muscle, to shew its *External Membrane*, which is very thin, whereby the last nam'd Muscle does more adequately compress the *Bulb*, and derive its contain'd Blood towards the Glands, when the *Penis* is erected.

K, The third Pair of Muscles of the *Penis*.

L L, The *Accelerator* Muscle divided in its middle Seam on the *Bulb*, and afterwards freed from it, and Expanded.

ll, The upper part of the Muscle, which passes immediately over the *Mucous Glands*.

M M, The *Musculi Directores Penis*.

NN, The *Cavernous Bodies* of the *Penis*.

O, The *Cavernous Body* of the *Urethra*.

P, The Ligature made to prevent the Wind from passing out of the *Cavernous Body* of the *Urethra*, and its *Bulb*.

Q, The Aperture by which the Inflation was made.

F I G. II.

ONE of the *Mucous Glands*, after being macerated in Water, and its *Excretory Duct* fill'd with Quicksilver.

A, The *Mucous Gland* somewhat distended.

b, Its *Excretory Duct*.

C, A Portion of the *Internal Membrane* of the *Urethra* expanded.

D, The *Ostiolum* of the last mentioned *Excretory Duct*.

T A B.

T A B. VI.

F I G. I.

THE Fore-part of the Human *Penis* prepar'd with Mercury.

AA, The Skin, together with the rest of the common Integuments of the *Penis*, freed from it.

aa, That part of them which compose the *Præputium*.

B, The beginnings of the *Corpora Cavernosa* separated from the *Ossa Pubis*.

bb, The Veins; cc, The Nerves; dd, The Arteries, as they appear on the back-part, or *Dorsum Penis*.

C, The *Glans* or *Balanus*.

DD, The *Musculi Eretores*.

EE, The *Transversales*.

F, Part of the *Sphincter Ani*.

f, A Blow-pipe in the *Urethra*.

GG, The Trunks of the two Arteries of the *Penis*, cut from the Internal Branches of the *Iliac* Arteries: gg, Their two Inferior Branches which run to the *Musculi Eretores*; hh, Their superior Branches which administer Blood to the adjacent Parts; ii, Those Arteries which pass to the *Bulb* of the *Cavernous Body* of the *Urethra*; kk, Their large Trunks which are subdivided again; the External of which dd, pass on the superior Surface of the *Penis*; the Internal ll, enter the *Corpora Cavernosa*.

HH, The Nerves of the *Penis*.

I, The *Vena Penis*.

KK, *Venæ Præputii* which inosculate with the former.

LL, The *Lymphæducts*.

F I G. II.

THE two *Corpora Cavernosa Penis*, and that of the *Urethra*, after a Transverse Section, when inflated and dry'd.

AA, The *Corpora Cavernosa Penis*.

B, The *Corpus Cavernosum*

Urethra.

C, The Trunk of the *Vena Penis*.

DD, The Trunks of the two Arteries passing through the *Corpora Cavernosa* of the *Penis*.

Fig. I.



Fig. II.

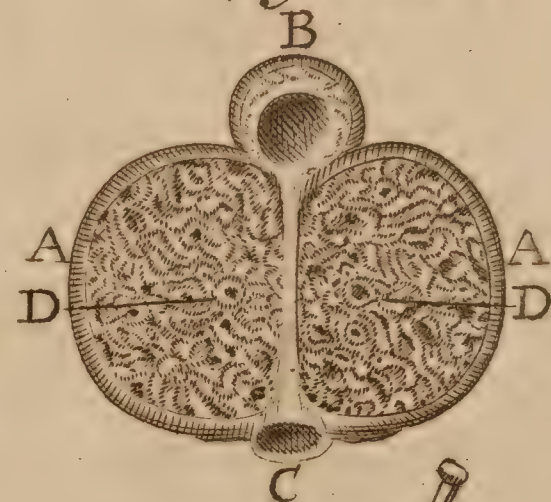


Fig: I.

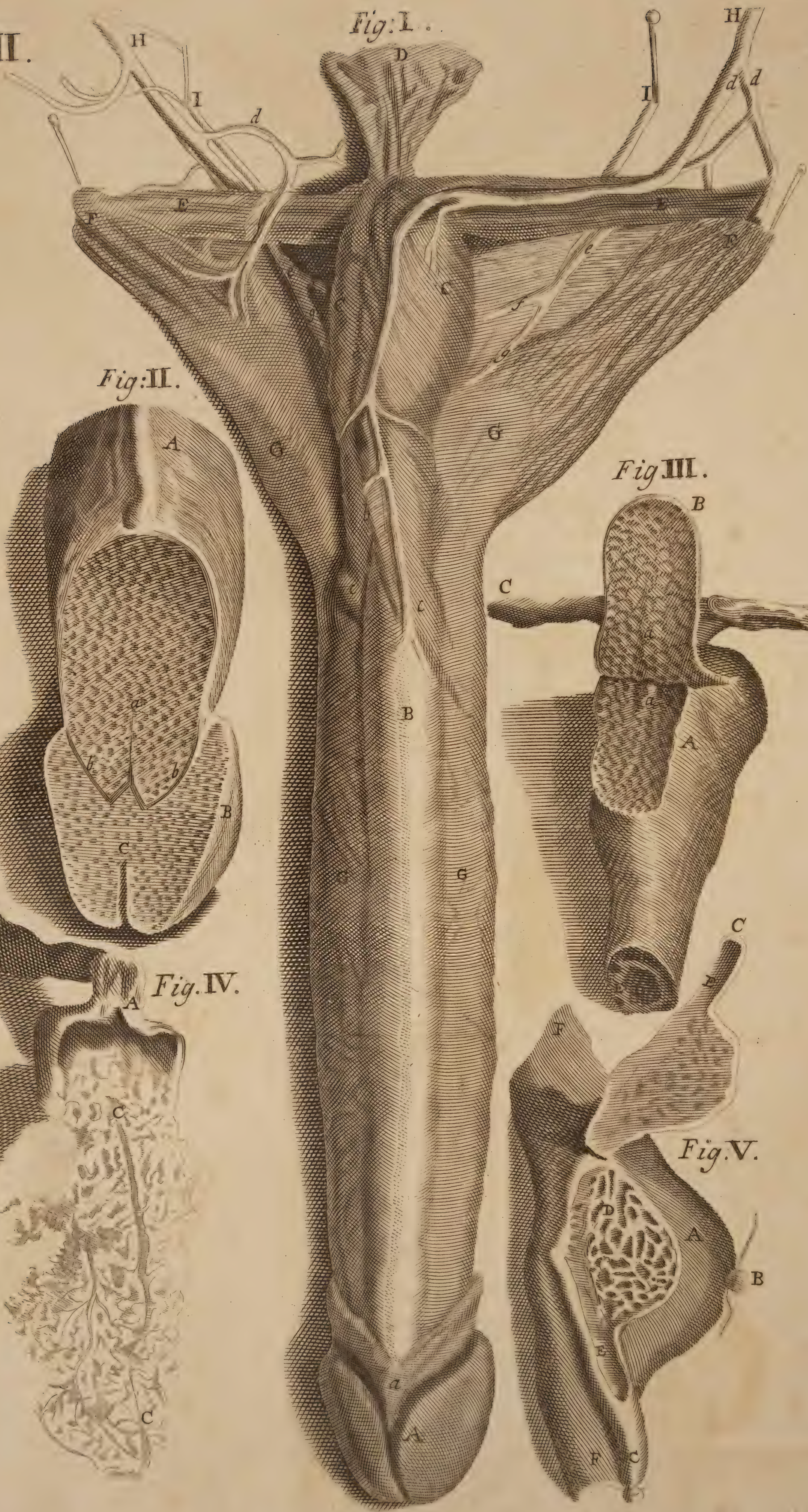


Fig: II.

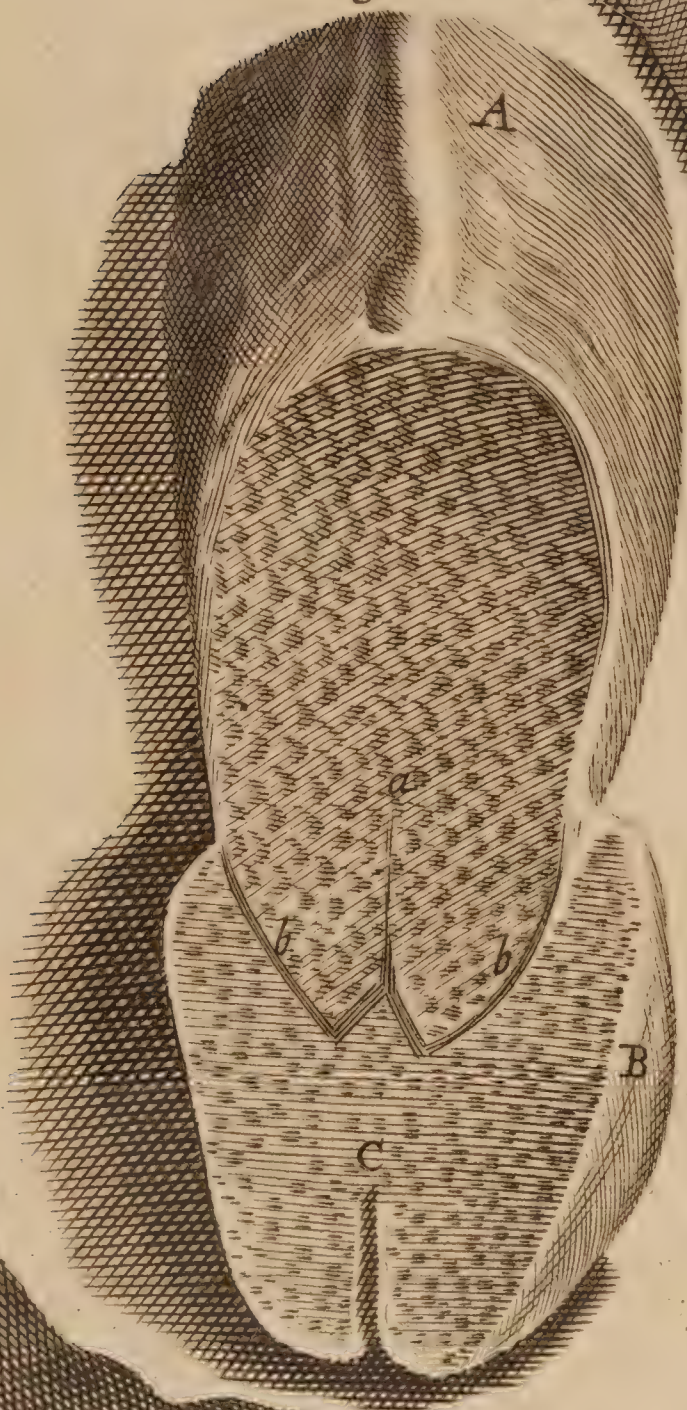


Fig: III.

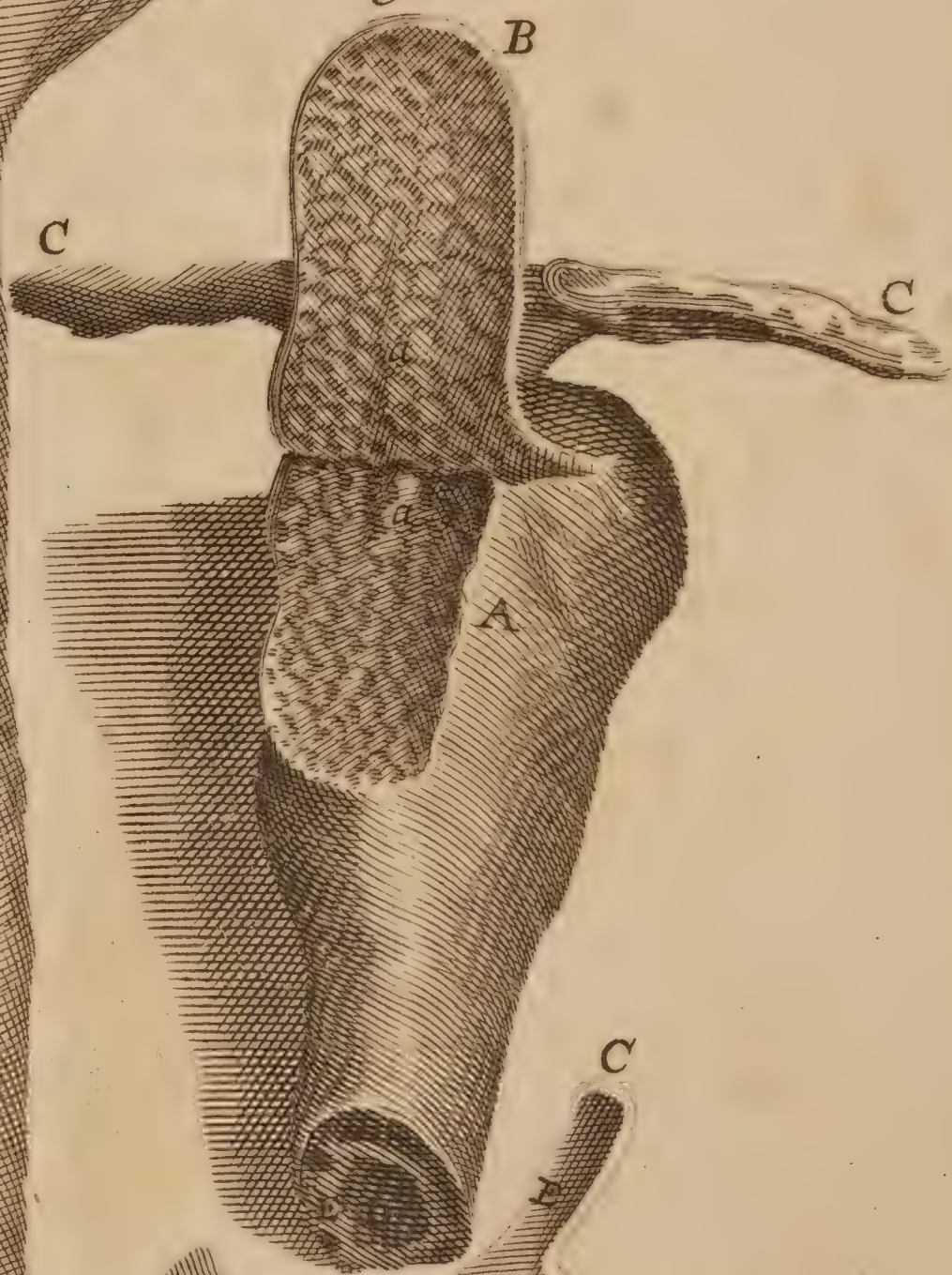
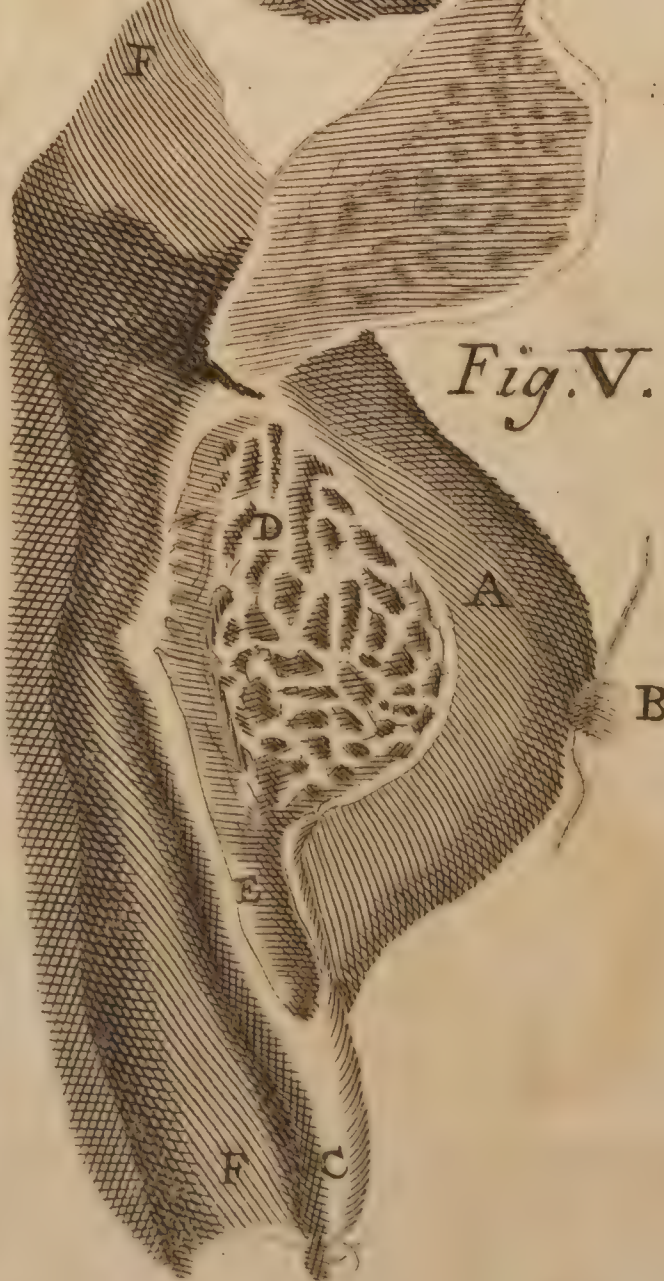


Fig: IV.



Fig: V.



T A B. VII.

F I G. I.

THE Back part of the Human Penis.

Penis it self.

D, Part of the *Spinster Ani.*

E E, The *Musculi Transversales Penis.*

A, The *Balanus.*
a, The *Frænum.*
B, The External Surface of the *Corpus Cavernosum Urethræ.*

F F, The *Directores* or *Erectores.*

CC, Its *Bulb* cover'd with the *Musculus Accelerator*; b, The Conjunction of its Right side with the Left, corresponding to the Seam of the Skin in the *Perinæum*; c c, Its two Extremities embracing the *Corpus Cavernosum Urethræ*, which terminate on the sides of the Cavernous Bodies of the

G G G G, the *Corpora Cavernosa Penis.*

H H, The Arteries; ddd, Those Branches administering Blood to the Muscles; e e, Two large Trunks of them which are subdivided into two more, f g.

I I, The Nerves of the Penis.

F I G. II.

SHews the Internal parts of the Extremities of the two Cavernous Bodies, and that of the *Glans Penis.*

A, The *Dorsum Penis*, cover'd with its *Capsula.*

B, The External part of the Glans.

a, Part of the *Septum* of

the *Corpora Cavernosa.*

b b, The Internal Membrane of the *Corpora Cavernosa Penis*, cover'd by the Glans.

C, The *Corpus Cavernosum Glanais Penis* on the Extremities of the *Corpora Cavernosa Penis.*

F I G. III.

EXhibits the *Bulb* of the Cavernous Body of the *Urethra*, being dry'd after Inflation.

A, The External part of the *Bulb*, divested of the *Musculus Accelerator Urinæ.*

B, Part of the *Bulb* raised after Section, to shew its Internal Cavernous Structure.

a, *Septum Bulbi.*

C C, *Musculi Transversales.*

F I G. IV.

SHews part of one of the Cavernous Bodies of the *Penis*, being likewise dried after Inflation.

A, That part of the *Capfula* of the Cavernous Body next the *Os Pubis*, which is here compress'd by the Li-

gature made to retain the Wind.

B, *Musculus Erector Penis*.

CC, The Artery, as it is distributed within the Cavernous Body of the *Penis* on either side.

F I G. V.

Represents the *Bulb* of a Dog's *Penis* after Inflation.

A, The external Surface of the *Bulb*.

B, A Ligature made on a Vein that arises from the superior part of it, into which the Veins of the *Præpuce* enter, and may therefore be call'd *Vena Præputii*.

CC, The large Trunk of one of the Veins of the

Penis it self, which in this Animal is double, arising from each side the *Bulb*.

D, The internal Appearance of the *Corpus Cavernosum* of the *Bulb*.

EE, The Cavity of the Vein, which communicates with the *Cavernulæ* of the *Bulb*.

F F, *Corpus Cavernosum Penis*.

C H A P. XXI.

Of the Organs of Generation in Women.

Hitherto we have follow'd the Method, that the Connexion and Dependance of the Parts upon one another have led us into. But this being a single Subject, and a Specification of the Difference betwixt Sexes, we shall follow the Method of *De Graaf* in it, as the most natural, and the most easy for an Enquirer to follow.

Division.

The PUDENDUM MULIEBRE is divided into Parts External and Internal: The External are those

those which offer themselves to the View without Dissection, tho' some of them require a Diduction of the *Labia* before they can be seen. These *External* are the *Rima*, *Labia duo*, *Mons Veneris*, *Clitoris*, *Nymphæ duæ*, the *Exitus* of the *Meatus Urinarius*, and the Orifice of the *Vagina*. *Part of the Pudendum.*

The *Rima* is nothing else but the *External Rima*. Aperture situated below the *Os Pubis*, between it and the *Anus*; and the space betwixt the *Rima* and the *Anus* is call'd the *Perinæum*.

The Skin on each side of the *Rima* is supported and plumped up with the Fat of the *Membrana Adiposa*, which is here thicker than ordinary, and makes together the *Labia*. *Labia Tab. viii. Fig. ii. and iii.*

Just above the *Labia*, between the *Inguina* is the space which is call'd the *Pubes*; the middle, and most prominent part of which, has been nam'd *Mons Veneris*, which is a little Protuberance occasion'd by the more than ordinary Collection of Fat under the Skin in that Place. All these Parts are cover'd with Hair, as most other parts, where the Miliary Glands of the Skin are larger than ordinary, and cover'd with Fat, usually are. *Mons Veneris.*

These being absolutely *External*, are exposed to view without Diduction, and they, as well as the adjacent, have been call'd by variety of Names, which either the Wantonness, or other Humours of Men, have furnished them with: But those being of no service to our present Purpose, we shall omit them, and stick only to the most simple and familiar of them among Anatomists, as Modesty directs us.

In the upper part of the *Pudendum*, just within the *Labia*, is the *CLITORIS*; a Body ordinarily about the size of the *Uvula* when it is not relax'd. But sometimes, by extraordinary Means, and in extraordinary Cases, it will be extended almost to the bigness of the *Penis* of a Man, which *Clitoris. Tab. viii. Fig. iii. App. Tab. xxxiii. Fig. vi.*

Hermaphrodites.

at all times it resembles very exactly in its Figure, except that it is not perforated. The extraordinary Size of this part, and its Propendence sometimes out of the Body in Infants, makes the Women mistake such Children for that sort of Monsters they call *Hermaphrodites*. Of this sort I had one brought to me upon another Occasion, the *Clitoris* of which hung out of the Body so far, at about three Years old, that it resembled very much a *Penis*, but it wanted the Perforation, and instead of that, just behind it, the Urine issued at a hole, which was nothing else but the corner of the *Rima*, the *Clitoris* filling all the rest of the Orifice: So that the Parents mistook it for a Boy, and as such christned it, and as such esteemed it when it was brought to me. But the Neighbours, who had notice of this Appearance, call'd it an *Hermaphrodite*.

Corpora Cavernosa Clitoridis.

The *Clitoris* consists of two nervous or spongy Bodies, like those of the *Penis*, which have their Origine from the lower part of the *Os Pubis* on each side, which coming together form the Body, which is call'd the *Clitoris*: Which tho' it has no Perforation Analogous to that of the *Penis*, yet has a *Septum*, or Membranous Partition, which runs all along between these two Nervous Bodies, from the *Glans* to its Divarication at the *Os Pubis*, where they are call'd *Crura Clitoridis*, and are near three times as long as the ordinary Trunk of the *Clitoris* it self.

Septum Clitoridis.

Crura.

Glans Clitoridis.
Tab. viii.
Fig. ii.

At the End of it is a *Glans*, resembling in Proportion that of the *Penis*, except, as has been said, the Perforation. This *Glans* is covered with a *Præputium*, form'd out of the inner Membrane of the *Labia*.

Muscles of the Clitoris.

The *Clitoris* has a Pair of Muscles arising from the *Ossa Coxendicis*, and terminating in its *Crura*, and serving to erect the *Clitoris*. Some Authors ascribe another pair of Muscles coming from the

Sphincter

Sphincter Ani, which are by others thought only to be the Constrictory Muscles of the *Vagina*, and assist in hindring the Reflux of the Blood from the *Clitoris*, &c. in *Coitu*. App. Tab. xxxiii. Fig. vi.

It has Arteries from the *Pudenda*, and its Veins return to the *Hypogastricks*. The Nerves come from the Intercostals, and run in pretty large Twigs along the back of it. Hence it is that it appears so extremely affected in the Act of Coition. Blood-Vessels.

After the Blood-Vessels and Nerves have part- ed with Branches to the *Clitoris*, they are partly spent in a Cavernulous Substance, call'd, by *De Graaf*, *Plexus Reticularis*, that environs the *Pudendum* immediately under the *Nymphæ*, to which they also send Branches. All these parts being fill'd with Blood, do more adequately embrace the *Penis* in *Coitu*; and by their intumescence they not only force out the Contents of the *Lacunæ*, or Excretory Ducts of the *Prostatae*, or *Corpus Glandulosum* in the Neck of the Bladder, but by excluding the external Air, the *Semen Masculinum* is injected to the *Fundus Uteri* and *Fallopian Tubes*; and that more especially, if we consider that the *Parietes* of those Parts are furnished with a vast Number of Blood-Vessels, especially Veins, and on their Intumescence, that the internal Air must be rarified in those Cavities, by which means the *Semen Masculinum* passes to the *Ovaria*. Corpus Cavernosum seu Reticulare Pudendi. Tab. ix. Fig. ii.

The *Nymphæ* or *Alæ*, are soft, spongy, red Bodies, descending from the top of the *Clitoris* (to which they firmly adhere) to the sides of the *Meatus Urinarius*, thereby reaching to about the middle of the *Orifice* of the *Vagina*, where growing insensibly less and less, they disappear: So that their length may be accounted from the *Clitoris* to the middle of the *Orifice* of the *Vagina*: Their Breadth is very uncertain, but in Maids usually about that of half a Finger. They are Nymphæ. Tab. viii. Fig. ii.

sometimes found much larger, and are capable of being distended to a great degree, so as to hang a good way out of the Body, and in some, these, as well as the *Clitoris*, have been forc'd to be cut.

Tab. viii. Their Figure, taken together, is a kind of half Oval. Their Substance is soft and spongy, compos'd of Membranes and Vessels loosely cohering, and therefore easily distensible.

Use of the Nymphæ. The Use of them is by swelling in the Act of Coition to embrace the *Penis*, and by their Sensibility to affect the Woman, and mutually to invite to Procreation. They have their Blood-Vessels and Nerves in common with the *Clitoris*.

Orifice of the Vagina. Fig. ii. Just behind the *Nymphæ* is the Orifice of the *Vagina*, which in Virgins, especially such as have not yet had the *Catamenia*, or but very rarely, is very streight, but in those that have had them often it grows larger, but more in married Women, and most in those that have had Children.

Orifice of the Urethra. Just above the Orifice of the *Vagina* is the ORIFICE of the URETHRA, opening with a little Intumescence. It is externally cover'd with a whitish Substance, which is partly Glandulous, and partly Membranous, out of which issues a Glutinous Limpid Matter through certain Ducts, which comes from the inward part of the *Meatus*, and serves to anoint the Extremity of the *Urethra*.

Hymen. Fig. iv. In the Dissection of these Parts, nothing has more exercised the Curiosity of Anatomists than the *Hymen*, who not only differ and contend about the Figure, Substance, Place, and Perforations of it, but even about the Existence it self, which some positively affirm, others as flatly deny. And even *De Graaf* himself, the most industrious and accurate Enquirer into these Parts, confesses that he always sought it in vain, tho' in divers Subjects, and in various unsuspected Ages.

All

All that he could find was a different Streightness, and different Corrugations, which were greater or less, according to the respective Ages: The younger they were, the *Foramen* being the streighter, and the Rugosities the greater, the former the necessary Consequences of the latter. For as in time the Parts grew, the Membranes were extended, and so the Surface of them grew gradually more smooth and plain.

Whether it is to be found in all Subjects, I dare not affirm, but in those few which I have had opportunity to examine, I do not remember to have miss'd it in any Subject where I had just reason to depend upon finding it, if it were constant. The fairest View, which I ever had of it, was in a Maid who dy'd at about thirty Years of Age.

In Infants it appears to be a fine thin Membrane, not very conspicuous, because of the natural Streightness of the Passage it self, and of the *Foramen*, which, tho' very small, did not allow of any great Expansion in so little room, and consequently might appear to *De Graaf* a Corrugation only of the inner Membrane. But in this Subject we found it to be a Membrane of some Strength, furnish'd with carnous Fibres, in Figure round, and perforated in the middle with a small Hole, capable of admitting the end of a Woman's little Finger, situate a little above the Orifice of the *Meatus Urinarius*, at the Entrance of the *Vagina*.

It is probable that this Membrane, as most others do, grows more distinct, as well as firm, by Age: And that it is sometimes very strong and impervious, may be collected from the History of a Case reported by that skilful Anatomist Mr. *Cowper*, in his *Explications* of the fifty first Table of *Bidloo's Anatomy*. I was call'd (says he) to *forate* a married Woman of above twenty Years of Age, *Hymen*, whose

whose lower Belly was distended as if with Child. Upon examining the Pudendum, we found the Hymen altogether impervious, and driven out beyond the Labia Pudendi, in such manner, that at first sight it appeared not unlike a Prolapsus Uteri. In the upper part towards the Clitoris, we found the Orifice of the Meatus Urinarius very open, and its sides extruded, not unlike the Anus or Cloaca of a Cock, and without any difficulty I could put my Fore-finger into the Bladder of Urine. On dividing the Hymen, at least a Gallon of Grumous Blood, of divers Colours and Consistencies, came from her, which was the retained Menstrua. The next Day no less Quantity of the same Matter flow'd, after removing the Pessary which I had put in the Day before. After three or four Days she was easy, and soon after recovered, and within a Year was deliver'd of a healthful Child. Her Husband told us, tho' lying with her at first was very painful to himself as well as her, yet at last he had a more easy Access, which could be no other way than by the Meatus Urinarius.

This History proves that this Membrane is not only a strong Membrane, which could make resistance to that force, which overcame the *Meatus Urinarius*, and *Sphincter* of the Bladder which is considerably strong; but by admitting of so great a Dilatation, as to hang *extra Pudendum*, shews that the Structure of it is Fibrous, and consequently capable of great Distensions.

Whether this Membrane be always to be found in unvitiated Subjects, is more than I can pretend to determine. The Scarcity of them in Adult, will not let me presume to decide upon my own Observation, and much less can I do it upon any Agreement of Authors: Among whom I find some, who are most accurate, doubtful about its Existence.

Adjoining, or rather in the Place of this *Hy-* Caruncu-
men in Adults, in whom it is not found, are four *læ Myrti-*
 little Caruncles, or fleshy Knots, about the big- *formes.*
 ness of Myrtle-Berries, from whence they are *App. Tab.*
 call'd *Myrtiformes*, which some suppose to be *xxxiii.*
 largest in Maids, and by degrees to grow less *Fig. xi.*
 thro' the Use of *Venery*: Others, with more Pro- *B B.*
 bability, in my Opinion, derive them from the
 broken Membrane of the *Hymen*, whose Frag-
 ments shrunk up, they take them to be. Which
 of these is in the right, I am not able positively
 to say, having yet never seen them, where the
 use of *Venery* had not preceded.

The Mosaical Test of Virginity has occasion'd *The Mo-*
 abundance of Speculation about these Parts, con- *saical Test*
 cerning which, the nicest Enquiries can settle *of Virgi-*
 nothing certain. Whatever might be depended *ty, why*
 upon among the *Jews*, in these Countries there *too severe*
 may not be the same reason to expect those *for these*
Tokens of Virginity, tho' not at all to be suspected. *Northern*
Climates.
 For, besides that they marry extremely young,
 as it is the Custom of all *Eastern* Countries so to
 do, (whether a *Hymen* be constantly to be ex-
 pected or not) there are many Circumstances
 which may disappoint such Expectations, even
 in Virgins not vitiated by any Male-Contact, or
 Wantonness of their own. For whatever may
 be the Case of those Countries, in these *Northern*
Climates, the Inclemency of the Air exposes them
 to such Checks of Perspiration, as give a great
 Turn to the Course of the Humours, and drives
 so much Humidity through those Parts, as may
 extraordinarily supple and relax those Membranes,
 from which the Resistance is expected, and from
 which, in hotter Countries, it might more reason-
 ably have been depended upon. Not but that
 those Marks are ordinarily found here, but in
 some that have liv'd long Virgins or are of very
 delicate Constitutions, the long Course, or ex-
 traordinary

traordinary Turn of Humours that way, may render Men unjustly suspicious, where no real Occasion is given. For in some, who preserve their Virginities a great while, and in others, whom a delicate Constitution exposes to a long or great Course of Humours through those Parts, such a Relaxation may be occasion'd as may deceive and offend those Men, who expect certain Marks of Virginitie, especially where a *Hymen* is wanting, which (for any thing that appears to me) may be miss'd oftener than it is found.

*Frustrated
often by
Diseases.*

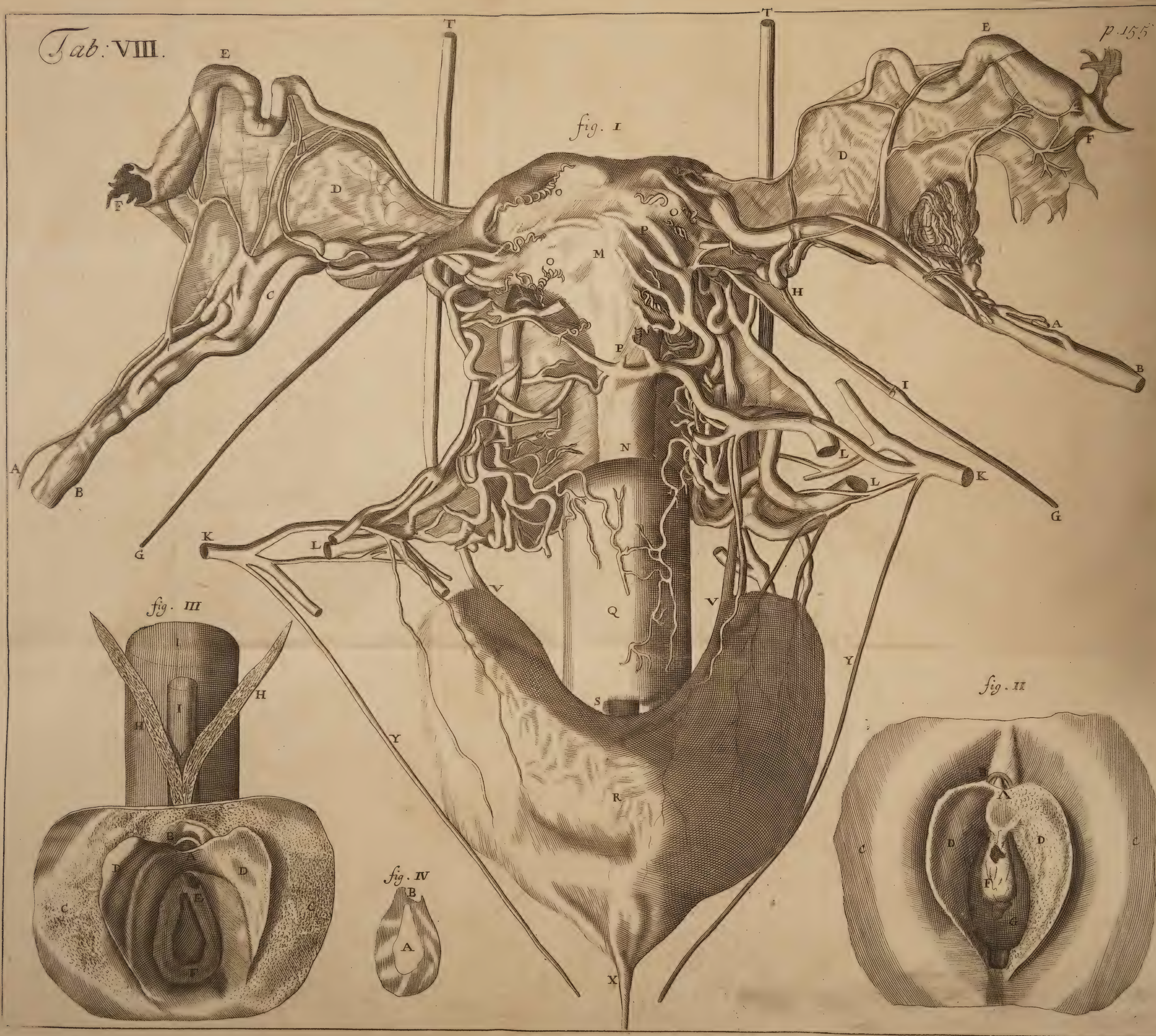
But even supposing a *Hymen* whole and unbroken, that, and the Membranes of the *Vagina*, may be so relax'd, through a long and great Course of the *Catamenia*, or from the morbid dripping of the *Fluor Albus*, that the purest Virgin may not be able to answer here Mens Expectations from the Mosaical Test, whatever might be just in those hot Countries.

All that is certain in this Case, is, that they who have plainly the Mosaical Signs of Virginitie cannot be suspected; the others may, though perhaps unjustly. There are other Accidents which may disappoint these Expectations of Virginitie, without any trespass on the Woman's part, which, without a History of the Diseases of those Parts, (which it is not our Intention to give here,) it is improper to enumerate.

T A B. VIII. From Swammerdam.

F I G. I.

THE Fore-Prospect of the *Uterus* of a Woman after Delivery. and *Fundus* of the *Uterus*.
 CC, The *Corpora Pyramidalia*, compos'd of the
 AA, The *Spermatick Arteries* and *Spermatick Arteries* and *Veins*.
 BB, The *Spermatick Veins* DD, The membranous
 distributed through the *Tubes* or Broad Ligaments of the
 Womb,



Womb, through which the Blood-Vessels pass to the *Fallopian Tubes*, call'd by some *Alæ Vespertilionum*.

EE, The *Fallopian Tubes* well express'd.

FF, The Aperture at the *Expansum Foliaceum*, on each side.

GG, The round or inferior Ligaments of the Womb.

H, The Origination of the Veins and Arteries of those Ligaments.

I, The Valve in the Vein of the round Ligament, hindring the Relapse of the Blood to the *Uterus*.

KK, The two Hypogastrick Arteries.

TT, The Hypogastrick Veins variously contorted, and in their Progress implicated and perplex'd with the Arteries.

M, *Fundus Uteri*.

N, The *Cervix*, or Neck of it, at the end of which is

the inner Orifice of the Womb.

OOO, The Arteries on the *Fundus*, or bottom of the Womb, curl'd like the Tendrils of a Vine.

PP, A great Number of Veins running over the exterior *Tunic* of the *Uterus*, in which the *Anastomoses* are singularly remarkable.

Q, The *Vagina Uteri*.

R, The Bladder of Urine, inverted to shew the Tortuosity of the Arteries of the *Vagina*, by which means its proper Vessels are represented somewhat longer than they ought to be.

S, The Orifice of the *Urethra* in the *Vagina*.

TT, The *Ureters*.

VV, The Insertion into the Bladder, which is here turn'd downwards.

X, Part of the *Urachus*.

YY, The Umbilical Arteries.

F I G. II.

EXhibiting the *Pudendum* of a Virgin, taken fresh out of the Body, and display'd.

T, The *Glans* of the *Clitoris*, resembling that of a *Penis*.

B, The *Præpuce* of the *Clitoris*.

CC, *Labia Pudendi*.

DD, *Nymphæ*.

E, The Orifice of the *Urethra*.

F, The *Caruncle*, that closes the *Meatus Urinarius*, in which are divers *Fissures*.

G, The *Hymen*.

F I G. III.

THE *Pudendum* of a Virgin, with its *Clitoris* dry'd.

T, The *Glans* of the *Clitoris*, answering that of a Man.

B, The *Præpuce* of that *Glans*.

CC,

- CC, *Labia Pudendi.* Clitoris cut to shew the Sub-
DD, *Nymphæ.* stance of its *Cavernous Bo-*
E, The Orifice of the dies.
Meatus Urinarius. I, The Urinary Passage
F, The *Hymen.* cut off near the Bladder.
G, The Perforation of K, The Neck of the *Ute-*
the *Hymen.* rus cut off.
HH, The *Crura* of the

F I G. IV.

- A, THE Perforation, or *Hymen* next the *Meatus U-*
Slit of the *Hymen.* *rinarius.*
B, The upper part of the

Meatus
Urinarius.
App. Tab.
xxxv.
Fig. i.

The *Meatus Urinarius* in Women is very short : It is lin'd internally with a very thin Membrane, and next to that is a Coat of a white Substance, of which an account is given in the Description of the Orifice : Through this Coat, from some *Lacunæ* in it, those Ducts pass, which convey the Liquor spoken of before in the account of the Orifice. It is very dilatable, as the Practice of Extraction of Stones, (of extraordinary Size) without cutting, proves ; as well as the History before recited under the *Hymen*.

Vagina
Uteri.
App.
Tab. ib.
Fig. ii.

The *Vagina* of the *Uterus*, is a Membranous part, reaching from the *Rima* just above the *Labia*, to the Neck of the *Uterus* : It lies upon the *Intestinum Rectum*, to which it firmly adheres, and under the *Vesica Urinaria*. It is reckon'd to be seven or eight Inches long.

Substance.

The inward Substance of it is Nervous, and exquisitely sensible : The outward Membranous, and of a loose Texture, with carnosus Fibres running longitudinally upon it.

Orifice.

At the Orifice it is much narrower than elsewhere, particularly in Virgins, especially very young ones. Through the whole Course of it, it appears to be wrinkled, especially on the upper internal surface. The Use of *Venery* renders these

these *Rugæ* less apparent ; and frequent Parturi-
 tion almost obliterates them ; which shews that
 they were contriv'd to render the Part more easi-
 ly distendible for Parturition.

Along the whole Tract of the *Vagina*, there
 are a great many Pores, or *Ostia*, or little Ducts
 to be seen, which in Acts of Venery, emit a Li-
 quor, that has been by many mistaken for Seed,
 and are found in greatest Plenty about the lower
 part of it, especially about the *Exitus* of the *Mea-
 tus Urinarius*.

The *Vagina* has likewise a Constrictory Muscle
 inserted under the *Clitoris*, which, with a broad
 Series of Fibres embraces and constricts the
 lower part of the *Vagina*, spoken of before.

The *Uterus* or *Matrix* is situated in the *Pelvis*
 of the *Hypogastrium*, between the *Intestinum re-
 ctum*, and the Urinary Bladder. It is surrounded
 and defended by mighty Bones, before by the *Os
 Pubis*, behind by the *Os Sacrum*, on each side
 by the *Os Ilium*, and *Ischium*. It is in Figure
 something like a flat Flask, or a dry'd Pear. In
 Women that are with Child, it receives different
 Forms, according to the different Times and Cir-
 cumstances of Gestation.

In Maids and Old Women long past their
Menses, it is pretty near of a Size. It is divided
 by Anatomists, as all other Cavities of this kind
 are, into the *Fundus* and *Cervix* : A broad Part,
 and a Neck : And is in Extent from the Extre-
 mity of one, to that of the other, about three
 Inches in length. Its Breadth at the *Fundus* is
 about two and an half, and its thickness two.

It has but one Cavity, unless we make a di-
 stinction between the Cavity of the *Uterus*, and
 that of its *Cervix* or *Neck*. That of the *Fundus*
 is very small, scarce sufficient to contain a Gar-
 den-Bean. At the bottom, or Neck, it grows
 excessive narrow in Virgins, unless at the time
 of

*Ostia
 Vaginæ.
 App.
 Tab. ib.
 Fig. ib.*

*Uterus.
 Tab. ib.
 Fig. ib.*

Its Figure.

*Magni-
 tude.*

*Cervix.
 Fundus.
 Tab. ib.
 Fig. iii.*

Cavity.

of Purgation, scarce wide enough to admit a Crow's Quill: The Extremity of which Passage is call'd the *Osculum Internum*. In pregnant Women it opens more especially towards the time of Delivery. But to obviate the Inconveniencies that might happen by the Womb's remaining open, it is, as it were, seal'd up with a sort of Glutinous Matter, that issues from the Glands about it.

Orifice of
the Neck.

Tab. ib.
Fig. ii.

The lower Orifice of the Neck, looking towards the *Vagina*, is a little prominent, and resembles, in some measure, the Glans of the *Virile Organ*. The Substance of it appears to be very firm and compact, yet is nevertheless dilatable to a great degree, as appears by the Exclusion of a full grown *Fœtus*.

Substance
of the U-
terus.

The Substance of the *Uterus* is Membranous and Carnous. It consists of three *Tunics*, or according to some, who deny that Name to the middle Substance, of two only.

External
Tunic.

The *External Tunic*, which is call'd the *Communis*, is deriv'd from the *Peritonæum*. This consists of two *Lamellæ*, and is pretty thick and strong. The Exterior of these are smooth, the Interior somewhat rugged, and uneven, through the Connexion of the subjacent Parts. This Membrane invests the whole Womb, and connects it to the *Intestinum Rectum*, Bladder of Urine, and other adjacent Parts.

Middle
Tunic.

The middle *Tunic* is very thick, and is compos'd of thick strong Fibres variously dispos'd. It seems to be Muscular, and is by some thought to contribute to the Exclusion of the *Fœtus*, and other Contents of the Womb. Tho', in my Opinion, that is not the Office of it; and this, as the Muscular Membranes of other Parts, serves only to recover the Tone after any violent Distension.

The Inner *Tunic* is *Nervous*. It is thin, and in *Inward* the *Fundus Uteri* smooth, but in and about the *Tunic*. Neck very much wrinkled, and pierc'd with abundance of little Holes, like the Mouths of Ducts, out of which, upon pressing, issues a clear, ropy Liquor, which probably is that which seals up the Mouth of the Womb, in the time of Gestation.

The *Uterus* is connected by its Neck to the *Connexion*. *Vagina*, behind by its outward common Membrane, and before by the same to the *Vesica Urinaria*. Its sides are ty'd to other parts, but the *Fundus* of it is left loose, that it may expand and dilate with more Freedom, according to particular Exigencies.

The Ligaments are in Number four, two of *Ligaments*. them call'd the broad Ligaments, and two Round, from their Figure.

The broad Ligaments are Membranous, and *Broad Li-* arise from the *Processus* of the *Peritonæum*, from *gaments*. which they branch off about the Loins, and are *Tab. ix.* fastned to the sides of the *Uterus* and *Vagina*, and *Fig. i.* serve to prevent their falling down. They contribute likewise towards the sustaining the *Ovaria Tubæ Fallopianæ*, and other Vessels, which they, as it were, embrace.

The Round Ligaments arise from the sides of *Round Li-* the Womb, at the place where the *Tubæ Fallopi-* *gaments*. *anæ* are join'd to it. At their first rise they likewise are broad, but by degrees, as they recede farther from the Womb, they grow round and smooth. *Tab. ib.* And as the Spermatic Vessels do in Men, pass betwixt the Duplication of the *Peritonæum*, and so out of the *Abdomen* thro' the *Foramina* of the Oblique and Transverse Muscles of the *Abdomen*, then running obliquely upon the *Os Pubis*, they there terminate under the Fat near the *Clitoris*. By the Passages of these Ligaments, Women and Girls especially are expos'd to Inguinal Ruptures, as
Men

Men are by the Passages of the Spermatick Vessels.

Substance
of the Li-
gaments.

Broad.
Tab. viii.
& x.

The Substance of the Broad Ligaments is Membranous, loose and soft, whence they have been compar'd by some to the Wings of Bats, and call'd *Alæ Vespertilionum*; and from the Intertexture of some Fibres, others have mistakenly fancy'd them to be Muscles. After hard Labour, and a forc'd Delivery, these Ligaments are sometimes over-strain'd so far, as not to recover their Tone, whence follows a Propendence at the *Pudendum*, which is term'd *Prolapsus Uteri*. But whether properly so call'd, and that Appearance be a real *Prolapsus* of the *Uterus*, or only a Dilatation, and propendence of the *Vagina* only, as some would have it, is an Enquiry not of this Place.

Round.

Tab. x.

The round Ligaments are of a firmer Texture, and consist of a double Membrane, wrapping up in it Arteries, Veins, Nerves and *Lymphæducts*, intermix'd with fleshy Fibres, whence some have mistaken these also for Muscles. The Blood-Vessels and Nerves, both in these and the Broad Ligaments, are numerous, and make up a great Part of what is call'd their Substance. These, as the others, serve to keep the Womb in its right Position, and are capable of being injured, by the Violence of unskilful Midwives, in hasty, forc'd Deliveries.

Hysterick
Passions.

By these Ligaments the *Uterus* is kept so tight in its proper Situation, that no Violence of internal *Flatus* or *Humours* can raise it above its place. For as *De Graaf* observes, a Man pulling with both Hands, with all his Strength, cannot raise it above the *Os Sacrum*. This makes appear the Vanity of that Opinion which some have maintain'd after the great *Hippocrates*: That in Hysterick Passions, as they are improperly call'd, the *Uterus* rises, and pressing upon the Stomach and

Diaphragm

Diaphragm causes that Sense of Suffocation which Women feel in such Affections: An Error pardonable in the Times of that great Philosopher, when Anatomy was but rude, but not to be forgiven in Modern Physicians, who have the Means of knowing at the Expence of others Labour, (if they would take the Pains to read) the Absurdity and Impossibility of that Notion.

On each side of the *Fundus* of the Womb arises *Tubæ* a Duct, which opens into the Womb, with a very small Orifice, scarce admitting a small Style, or a Knitting-Needle, but in its Progress its Capacity grows greater, being large enough to admit the End of a Man's little Finger, and towards the end is contracted, and grows small again. At the end next the *Ovaria*, which is at liberty, it is again expanded into a sort of *Foliage*, which is fring'd round with innumerable little Fibres, like a ragged Fringe; which Expansion, when open'd, was thought by *Fallopious* the first Describer, to resemble the end of a Trumpet, and therefore the whole Duct was by him nam'd *Tuba*.

It consists of a double *Membrane*, the outward smooth and even, deriv'd from the common Membrane of the *Uterus*: The Inner, which springs from the inner Membrane of the Womb, is very much corrugated, more especially at the Extremities. That farthest from the Womb at the time of Impregnation, at which time the whole *Tube* is expanded, reaches to, and embraces the *Ovary*: At other times it seems to fall a little short of it, and is only slightly ty'd by a thin Membrane, reaching from the under part of the *Expansum Foliaceum*, to the under side of the *Ovary*. These *Tubes* are above five or six Fingers breadth long.

Both Arteries and Veins are very numerous here, especially the latter, which by Ramifications and Contortions make the main Substance

Tab. x.
Fig. ii.

of them, which is a kind of Reticular or Cavernous Body, consisting almost wholly of Blood-Vessels, not unlike that of the *Pudendum*, or *Cli-toris* before described. This Structure makes it capable of Dilatation and Contraction, according to the Quantity and Stop of the irruent Blood, and consequently of being erected (if I may use the Term) *in Coitu*, and of embracing the *Ovarium* at that time, which in its State of Flaccidity it did not reach.

No Valves,
nor Cells.

Dr. *Wharton* has ascrib'd *Valves* to them, and others have divided them into *Cells*: But tho' both are to be found in the *Cornua Uteri* of some Brutes, they are not to be met with in the *Tubes* of Women, which have but one Cavity, a little dilated in the middle, and no *Valves*.

Ovaria.
Tab. x.

Near the ends of these *Tubes*, about two Fingers distance from the *Uterus*, lie the *Ovaries*, or *Testes Muliebres*, so call'd from their Use, which was formerly suppos'd to be analogous to that of the *Testicles* in Men.

Connexion.

They are connected to the Womb by a strong Ligament, call'd by many Anatomists *Vas Deferens*, upon Supposition that it was a Vessel which convey'd the Seed to the Womb, and in some measure likewise by the *Tubæ Fallopiæ*, and by the broad Ligament. About the Region of the *Os Ilium*, they are fastned to the *Peritonæum* by means of the Spermatick Vessels, and the Membranes which cover them, by all which the *Ovaries* are kept suspended about the same height with the *Fundus Uteri* in Women not pregnant. In Pregnants they rise along with the *Uterus*, but not quite so high as that does in the last Months of Gestation.

Figure.

Their Figure is not so round as the Male *Testes*, but is a kind of Semi-oval: Gibbous on one side, and depress'd on the other, with a Superficies something

something uneven, thro' the unequal Protuberance of the *Ova* which they contain.

They are of different Magnitudes in the different Stages of Life. At the time of Puberty, when they are at their largest, they weigh ordinarily about a Dram and an half, and are about half the bigness of a Man's Testicle. In the Flower of Age they are Plump and Succulent, but as Age comes on, they wither and shrink by degrees, and grow hard and dry, so as sometimes at last to weigh not above a Scruple. Some Anatomists have affirm'd, that these, as Glandulous Parts, like the *Thymus*, were bigger in Infants, and decrease gradually after Birth; but *De Graaf*, who weigh'd many of those of new-born Children, says, he never found them weigh otherwise than between five and ten Grains.

They are cover'd externally with a common Membrane from the *Peritonæum*, to which some add a proper Membrane.

The Membrane being taken away, the Substance appears whitish, compos'd of a multitude of thin little Membranes, and slender Fibres, interwoven with a great Number of Arteries, Veins and Nerves.

Among these Fibres, Membranes and Vessels, are found interspers'd a number of little round Bodies, like Bladders, full of a limpid Substance like the White of an Egg, which boyl'd acquire the same Colour, Taste, and Consistence, with a boyl'd White of an Egg, from which Similitude, as well as from the Analogy of their Use, (being taken for the material Principle of Generations) they are now commonly call'd *Ova*, or Eggs, and the *Testes* in which they are contain'd *Ovaries*.

These Eggs are of very different Magnitudes in the same Ovary, tho' the biggest in a Woman seldom equals the size of a white Pear. They

are so numerous, that *De Graaf* has told above twenty in one *Ovary*. These Eggs have been found by Anatomists in the *Ovaries* of almost all sorts of Animals, and are not doubted to exist in the Females of all sorts of Animals whatsoever.

Hydatides.
Vide
Tab. ix.
Fig. i. e.

Besides these Eggs, there are sometimes found another sort of watry Bladders, which are supposed to be preternaturally there, because they are found but now and then, and sometimes bigger than the Eggs themselves. These are call'd *Hydatides*, and are probably the beginning of a Dropsy, commenc'd in this Part by the Eggs, and perhaps are no other than the *Hydropical Eggs* themselves.

An Hydropical
Dissection.

It is not unlikely that all those Dropsies of the Belly which Women labour with under the fallacious Name of Tympanies, have their first rise in these Parts. I have been present at the opening of several, and have always found the *Ovaria* distended with Water to an incredible Magnitude (tho' not always equally on either side) but especially in one, when a Gallon or more of Water was taken out of one Testicle, and the Membranes of the Testicles, after the Water taken out, so enlarg'd and thicken'd, that it appear'd by Hand to weigh some Pounds, but not having weigh'd it in Scales, we cannot tell the exact Weight of it.

Blood-Vessels.
Superior.

Tab. viii,
ix, x.
Fig. i.

The Blood-Vessels that go to the *Uterus*, and the appending parts, are divided into Superior and Inferior. The SUPERIOR are the same that are call'd in Men the *Spermaticæ*, and *Vasa Præparantia*, and have their Origines from, and Exit into the *Aorta* and *Cava*, as the Vessels of Men have. But not being sent out of the Abdomen, their course is shorter. The Branches which they distribute into the *Uterus* and *Vagina*, are larger and

and more in number, than those that go to the *Tubæ Fallopiæ* and *Ovaria*.

The INFERIOR are Branches of the *Hypo-Inferior. gastricks* and *Hæmorrhoidals*, and only scatter themselves upon the lower part of the *Vagina*. Those before-mention'd are pretty large, and are distributed all over the *Vagina* and *Uterus*, running after an irregular manner with abundance of Contortions, and joining very apparently by perfect *Anastomoses*, Arteries with Arteries, and Veins with Veins, as blowing into them, or Injections with any Liquor shew, especially the Injections of Wax.

But in the times of Gestation these Vessels grow very large, and plainly shew, even without Injection, their Communication, some of them being large enough to admit of a Swan's Quill.

They receive Nerves from the *Par Vagum* and from the *Cauda Equina* in the *Os Sacrum*.

Monsieur Nuck has given us an accurate Description of the *Lymphæducts* of the *Ovaria*, in his *Adenographia Curiosa & Uteri Fæminei Anatomie Nova*: They arise from the Surface of the *Ovaria* by several Branches, which unite and make three Branches on each side, and partly empty themselves into the *Lymphatick Glands* below the Emulgent Vessels, whence other exporting *Lymphæducts* arise, and empty themselves into the *Receptaculum Chyli*; others empty themselves immediately into the *Receptaculum*.

Tab. x.
Fig. i.

*Distended
in the
time of
Gestation.*
Tab. viii.

x.
Fig. i.
Nerves.
*Lymphæ-
ducts.*

T A B IX. From Swammerdam.

F I G. I.

SHEWS the *Uterus* of a *Virgin*.

AA, The *Spermatick Vessels*, from their Rise to their Dissemination through the *Ovaria*, *Tubes*, and *Fundus Uteri*.

BB, The *Corpus Pyramidale* on each side, compos'd of Branches of the *Spermatick Artery* and *Vein*.

C, The left *Testicle*, or *Ovary*, cover'd with its proper Membrane, thro' which Eggs appear protuberant.

D, The Distribution of the *Spermatick Artery* and *Vein* upon the left *Ovary*.

EEEE, The Branches of the same *Vessels* marching over the membranous Ligaments, or *Ala Vespertilionum*, to the *Tube* on each side.

FFFF, The *Spermatick* and *Hypogastrick Vessels*, which run curling together along the sides of the Neck of the *Uterus* under the *Tubes* and round Ligaments, and inosculate freely on each side.

GG, The *Hypogastrick Veins*.

HH, The *Hypogastrick Arteries*.

IIII, The *Anastomoses* of the *Arteries* express'd.

KKK, The various Implications and numerous Inosculations of the *Vessels* finely express'd.

LL, The left *Tube*, or Horn of the Womb.

M, The Aperture of the *Tube*, display'd with its Fringe, resembling the tatter'd Edges of a worn Cloth.

N, The Membrane of the *Testis* separated, and turn'd back to shew the *Ova* and the *Spermatick Vessels* going to and from them.

O, The right *Tube* inverted to shew its Capacity, thro' which the *Ova* descend to the *Uterus*.

P, The Fringe of the right *Tube*.

Q, The *Fundus* of the Womb obscurely protuberant.

R, A *Slit* in the Body of the Womb.

S, The Substance of the Womb, in which appear the Orifices of the *Blood-Vessels* cut transversly.

T, Part of the Membrane covering the *Intestinum Rectum*.

VV, The round Ligaments, which are nothing but the *Arteries* and *Veins* which go to the *Clitoris* and *Pubes*, wrapp'd up in their proper *Involucrum* or *Tunic*.

XX. *Crura Clitoridis*, or its Divarications, call'd by Swammerdam, *Crura Externa*.

YY, The cavernous Bodies of the *Uterus*, taken notice of by De Graaf under the Name of *Plexus Reticularis*.

laris, but here call'd *Crura Clitoridis interna*.

ZZ, The Vessels of the *Clitoris*.

a, The Bladder of Urine turn'd toward the right side.

B, The Insertion of the

Neck of the Bladder, near the *Clitoris*.

CCCCC. The *Ureters*.

dd, The Insertion of the *Ureters* into the Bladder.

ee, A *Hydatis*.

ff, The *Valves* of the *Vein*.

F I G. II.

A, **T**HE Body of the *Clitoris* distended with Wind, as it is with Blood in Coitu.

BB, Its *Crura* also distended.

CC, The Extremities of the *Corpora Cavernosa* of its *Crura*, cut from the *Ossa Pubis*.

DD, The *Musculi Erectores Clitoridis*, freed from the

Ossa Coxendicis, and left at their Terminations.

EE, The *Arteries*.

F, The great *Vein*.

GG, The Nerves of the *Clitoris*, which pass likewise to the *Corpus Cavernosum Pudendi*.

HH, The *Corpus Cavernosum Pudendi*, inflated by the *Veins* of the *Clitoris* F.

C H A P. XXII.

Of the Placenta Uterina, The Umbilical Vessels, The Membranes that involve the Fœtus, and the Liquors that they contain, The Situation of the Fœtus in the Womb, The Legitimate time, The Nourishment of the Fœtus, The Difference between a Fœtus before Birth and after.

AFTER Impregnation there is a new Production of Parts, that exist only during the time of Gestation, and afterwards are either discharged, or dry up and disappear.

Of these the Principal is the *Fœtus*, for the sake and use of which, all the rest are form'd: But of that more hereafter.

After the *Fœtus*, the most considerable for Bulk and Figure is the *PLACENTA*, by ancient *Placenta*.

Anatomists call'd *Hepar Uterinum*, for Reasons, which, since the Discovery of the Circulation of the Blood, are out of date. It is something in Figure like a Plate without Brims, about three quarters of a foot over, sometimes a foot. It is round generally, of a Figure *Concave Convex*. The Concave adheres to the *Uterus*, and is uneven with divers Protuberances and Pits, by which it made Impressions upon, and receiv'd them from the *Uterus*. The Place of it in the *Uterus*, whatsoever some pretend, is not certain.

Number.

In Women, unless in case of Twins, or more, there is but one: However, the Number generally answers the Number of the *Fœtus*. In some Brutes, especially in Oxen and Sheep, they are very numerous, (sometimes near an hundred, even for one *Fœtus*) small, and resemble pretty large conglomerate Glands.

Umbilical Vessels.

From the External, or Concave side, which likewise has its Protuberances, tho' cover'd with a smooth Membrane, issue the UMBILICAL VESSELS, which are in great Plenty distributed thro' the whole Substance of it.

The Umbilical Vessels are, two Arteries, a Vein, and the *Urachus*.

Arteries.

The ARTERIES arise from the *Iliacs*, generally near their division into external and internal, and thence pass on each side of the Urinary Bladder, through the Navel to the *Placenta*.

Vein.

The Umbilical Vein, from innumerable Capillaries united into one Trunk, descends from the *Placenta* to the Liver of the *Fœtus*, where it is partly distributed into the *Porta*, and partly into the *Cava*. The Trunk of this Vein, answerable to the Occasion, is above double the Capacity of either Artery. It is sometimes divided before it comes at the *Fœtus* into two Branches, and united again within.

The Arteries have in several Places Contortions or Convolutions, which form a sort of Knots, by the Number of which, our Midwives superstitiously reckon the Number of Children the Woman is to have.

Among these Umbilical Vessels may be reckon'd *Urachus*, the *URACHUS*, which, tho' not plainly found, except in Brutes, where it is indisputable, is in my Opinion however reasonably to be allow'd, tho' our Opportunities of Examination not being the same, it usually collapses, and grows so stiff before such Subjects come under our Examination, that we have not a fair Tryal: But the Necessity appearing to be the same, I can little more doubt the Existence of it than in Brutes, where it is exhibited beyond Contradiction.

To these Vessels are continued the Membranes *Membranes of the Fœtus.* which include the *Fœtus*, the interior of which including the *Fœtus*, and the Liquor wherein it lies is call'd *Amnios*, which is a white, soft, thin, transparent Membrane, containing in it a limpid Liquor, like a thin Gelly-Broth; of which the Stomach of the *Fœtus* being always found full, it is probably, in part at least, the Matter of its Nourishment.

On the outside of this is found a thin Humour, *Membrana Urinaria.* that in Consistence and other Circumstances resembles Urine, which, according to Dr. *Needham*, is contain'd in a proper Membrane, which he calls *Membrana Urinaria*, and receives the Discharge of that Liquor from the *Urachus*. But, Subjects proper for an Examination of this Particular being rare, Anatomists have doubted the Existence of this Membrane, and have chosen rather to make it a Duplicature only of the *Chorion*, and to leave the Liquor which it contains (which is no small quantity) unaccounted for, than to allow any thing analogous to the *Alantois* in Cows and Sheep, tho' the necessity appears

appears to be the same. For this they give no other reason, than that the *Urachus* of a human *Fœtus* is not permeable by the *Flatus*, and that the Membrane, which Dr. *Needham* calls *Urinary*, adheres in some places pretty closely to the *Chorion*. The first of which may happen generally, because such Subjects are not expos'd time enough to them to make a fair Enquiry; the latter carries no Weight at all with it.

Chorion.

The outward Membrane of the *CHORION* is a pretty thick, strong, whitish Membrane, cover'd with a Multitude of Branches of Veins and Arteries. It is divisible into two *Lamellæ*, whereof the outermost is thick and opaque, the inner thin and transparent. Those that deny the Urinary Membrane divide it into three: The innermost of which is as the outer, likewise pretty thick, contrary to the common Course of Nature; which is some Argument for its being a distinct Membrane.

Situation
of the
Fœtus.

Some Anatomists have pretended to give an account of the Posture of the *Fœtus* in the Womb, at the several times of Gestation. But these are so various and uncertain, that such Accounts are little to be depended upon. In the first Month it is of no Moment how it lies in the Womb; in the latter Months, after the *Fœtus* is grown not only Quick, but robust, it frequently changes its Postures of it self, as not only the Mothers themselves feel, but any body, by laying their Hands upon their Bellies, frequently may. However, their ordinary Posture is accounted to be sitting, with the Head uppermost, the Knees brought up between the Elbows, the Feet drawn back towards the Buttocks, the Hands clos'd below the Knees, and the Head dropping, with the Nose, as it were, between the Knees.

When

When the time of Birth draws very near, it generally turns it self, and, preserving as to the rest near the same Posture, presents the Head to the *Os Uteri*, which is the most easy and natural Posture for Delivery. When the Midwives find it thus offering, they say it lies right. Sometimes it presents the Feet first, and this way Women are deliver'd, but with great Difficulty and Pain. Sometimes likewise it lies a-cross, offering either a Hand, a Foot, a Knee, or an Elbow, and this way Delivery is impracticable, and unless the Midwife has the Address and Skill to turn it, as they boast that they do sometimes, either Mother or Child, or both must be lost. In this deplorable Case, the Life of the Mother is generally preferr'd to that of the Child, and the Child, by means of Instruments, has been brought away by Piece-meal.

Sometimes the Child dies in the Womb, which if not timely discover'd, and brought away, the Mother runs great Hazard. This sort of Births is not inconsistent with the Safety of the Mother. *Bartholin*, in a Book *De Insolitis Partûs Viis*, relates a great many stupendous Cases of Children dead and putrify'd in the Womb, the Parts of which have made their way through *Apostemations*; one whereof at the Navel was some Years in coming away, some Bones being discharg'd at long distant times, and making up in all, as he judges, sufficient for the Skeleton of Twins.

Delivery through an Apostemation.

Something like this hapned to a Gentlewoman of my Acquaintance, who receiving a great Fright after she was twenty Weeks gone with Twins, found her Belly insensibly to begin to sink on one side, and at length to grow very cold, flaccid, and flat, whilst the other side continued to swell and increase, till the due time of Delivery, when she was deliver'd of a live Child. With it came

A putrify'd Fœtus, and a living one kept together some Months in the Womb.

away

away abundance of foetid, putrify'd, black, and other colour'd Matter, mix'd with the Bones of a Child, which dy'd at the time of that Fright, and remain'd corrupting in the Womb till the time of Delivery. The *Placenta* of the Child which was born alive was very black, discolour'd, and in some measure putrify'd likewise. The Child however grew up to be a Woman, and is now alive, and bears Children, but has been from her Cradle obnoxious to scrophulous Tumours, Ulcerations, cutaneous Eruptions and Swellings. It is probable the Infirmary, to which this Gentlewoman is obnoxious, is owing to a Taint receiv'd from that unhappy Bedfellow in the Womb.

Partus
Cæsareus.

It happens sometimes likewise that the Mother dies, the Child yet living and vigorous in the Womb. In this Case, without Scruple or Delay, the Womb is to be cut open, by which means the Life of many Children has been sav'd, and some not yet come to Maturity for a natural Birth. This way our *Edward* the Sixth was brought into the World, and *Julius Cæsar*, from whom it has been ever since call'd *Partus Cæsareus*.

Time.

The legitimate Time of the Birth has been much controverted, tho' common Observation shews it to be about forty Weeks from the Time of Impregnation; and tho' very frequent Instances of those that go longer, or come sooner, are pretended, yet I believe this to proceed rather from the mistaken Accounts of the Women themselves, than from any Variation in Nature. We do indeed not only read of, but frequently see Births of seven and eight Months, but these may be reckon'd among the untimely Deliveries, and the Child is seldom or never mature, if there has been no Fallacy in the Reckoning. All Creatures have a stated Period for bringing their
Young

Young into the World at Maturity, and why it should be otherwise in Women, no Reason appears.

How the *Fœtus* is nourish'd in the Womb, has been a Question as much agitated among Anatomists as any whatsoever. Some contend that it is nourish'd by the Mouth, others will have it to receive its Increase, and to grow like a Vegetable from the Mother, as from the Root, of which the Umbilical Vessels are the Stem, and the Child the Head, or Fruit of this Plant-Animal, if I may use that Expression. But this Question, and some others, we shall wave here, as containing something of curious Argument, and deserving a more particular Discussion.

Nourishment of the Fœtus.

There are some Differences in the Structure, Mechanism, and Proportion of the Parts of a *Fœtus* from those of an *Adult*, of which the Principal are those about the Umbilical Vessels and Liver, and those about the Heart and Lungs. The most apparent of these is the *Funiculus Umbilicalis*, which is a Part that at the Birth is either broken, or cut away to the Navel. Here are two Arteries, and a Vein and *Urachus*, which after Birth become perfectly useless as Vessels, and drying, become impervious, and serve only as Ligaments to suspend the Liver.

Difference of the Fœtus before and after Birth.

In the Liver it self is the *Canalis Venosus*, which in a *Fœtus* maintains a Communication between the *Porta* and *Cava*, but after Birth dries up by degrees.

Canalis Venosus.

In, and at the Heart are the *Foramen Ovale* and *Canalis Arteriosus*, both which serve to maintain the Circulation of the Blood, and to divert it from the Lungs, which in a *Fœtus* are idle and useless, and of a darker Colour, and closer Consistence, than after they have been breath'd into, as appears by their swimming in Water after Birth, which they will not before do. This

Foramen Ovale, Canalis Arteriosus.

Diffe-

Difference in the Lungs affords an useful Experiment, in Case of the suspected Murther of Children, for if they were Still-born the Lungs sink in Water ; if born alive, they swim. The aforementioned Channels serve only for the use of a *Fœtus*, to prevent that Obstruction the Blood would otherwise have within the Lungs, before they have been open'd. After Breathing has open'd the Lungs, the Blood takes its Course through them, and these Passages close up.

Head.

The Head is much bigger in Proportion to the rest of the Body than afterwards ; the Bones are softer, and the Sutures enclos'd, leaving a great Space on the top of the Head, cover'd only with the Membrane, which is afterwards clos'd up with the Bones.

*Thymus,
Glandulæ
Renales.*

The *Thymus*, and *Glandulæ Renales*, are considerably larger than afterwards, for it does not increase in Proportion to the Age of the Person.

Brain.

Most other Glands are likewise bigger and softer, as the Brain it self is.

There are other Differences which are of no great Moment, and therefore not necessary to be mention'd here.

T A B. X. From Swammerdam.

F I G. I.

SHEWS the back Prospect of the *Uterus* of a Woman after Delivery.

A A, The *Spermatick Arteries*.

B B, The *Spermatick Veins*, which, after sending a number of Branches to the *Ovaria* and *Fallopian Tubes*, have divers notable *Anastomoses* with the *Hypogastrick Arteries* and *Veins*, about

the Neck of the *Uterus*.

C C, The *Arteries* and *Veins* that form on each side the *Corpus Pyramidale*.

D, The left *Testis*, or *Ovarium*, cover'd with its proper Membrane.

E, The proper Membrane of the right *Ovarium* open'd and expanded, to shew the Distribution of *Arteries* into the *Ova*, of which a few only

Tab. X

Fig: I.

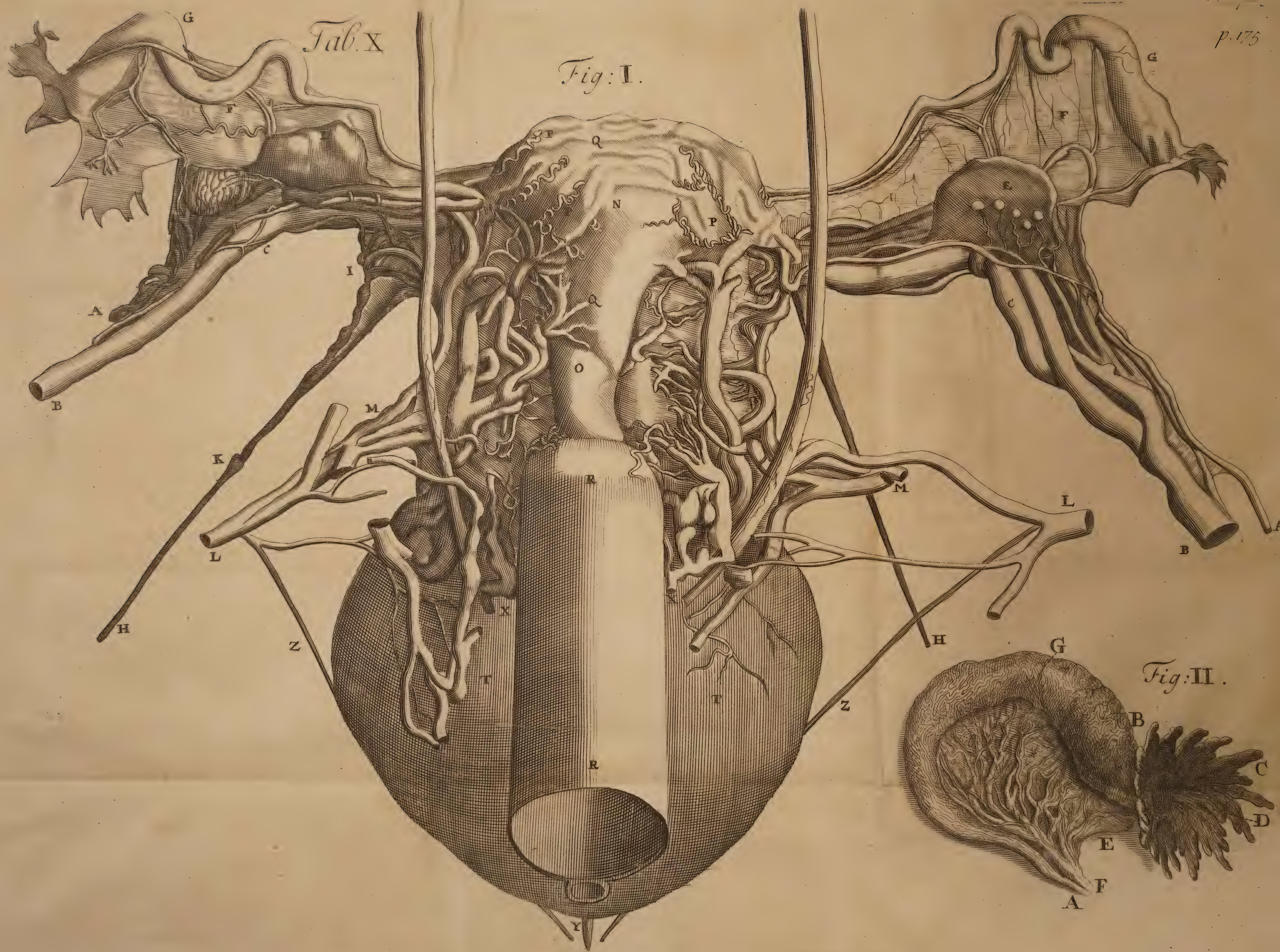


Fig: II.



only of the least are here figur'd, that they may appear more distinct.

F F, The membranous or broad Ligaments of the Womb, call'd *Alæ Vespertilionum*, which the *Spermatick Vessels* traverse in their way to the *Tubes*.

G G, The *Cornua*, or *Tubæ Uteri*, reaching from the *Fundus* of the *Matrix* to the *Ovaria*, and serving for the Conveyance of the *Ova* from thence to the *Uterus*.

H H, The round Ligaments of the Womb on each side.

I, The Rise of the *Arteries* and *Veins* of the round Ligaments on the left side.

K, A *Valve*.

L L, The two *Hypogastrick Arteries*.

M M, The *Hypogastrick Veins*.

N, The Body, or *Fundus Uteri*.

O, The Neck of the *Uterus*.

PPP, The *Arteries* on the Body of the *Uterus*, turn'd spirally like the Tendrils of a Vine.

QQ, Numerous *Veins* of the *Uterus* appearing prominent through the exterior Membrane, and shewing divers *Anastomoses* scatter'd up and down.

RR, The *Vulva*, or *Vagina Uteri*, reaching from the outward *Ostium* of the *Pudendum* to the inward one of the *Matrix*.

SS, The *Urethra*, or proper Channel of the Urine, cut off near the *Pudendum*, together with the *Vagina*.

T T, The lower Surface of the Bladder of Urine.

VV, The *Ureters* descending to the Bladder.

Y, A piece of the *Urachus*.

ZZ, The *Umbilical Arteries*.

F I G. II.

ONE of the *Fallopian Tubes*, with its Blood-Vessels fill'd with Quicksilver and Wind, to shew their Progress on one of the *Alæ Vespertilionum*, with the reticular Distribution of the *Veins* on the *Parietes* of the Tube, and its foliated Expansion; whereby these Parts become distended, and are render'd capable each of embracing the *Ovarium* on their own side, in order to convey the *Semen Masculinum* from the *Uterus*, as well as to transmit the impregna-

ted *Ovum* afterwards to its *Fundus*.

A, That part of the Tube next the *Uterus*.

B, Its other Extremitie, which is a little contracted before it makes its foliated Expansions.

CC, Its foliated Expansions here distended with Wind, as they are with Blood in *Coitu*.

D, The Orifice at the Extremitie of the Tube dilated.

E, One of the *Alæ Vespertilionum*, with its

F, *Veins*,

F, *Veins* and *Arteries* continued from the *Hypogastricks* of the *Uterus*; the former, *i.e.*

G, The *Veins* making a cavernous or reticulated Body on the sides of the Tube.

C H A P. XXIII.

Of the Catamenia, or Menfes.

Great Differences among Authors.

THE periodical Purgations of Women not with Child, or giving suck, is a *Phænomenon* that has exercis'd the greatest Wits of the Faculty, who after many learned Arguments, and many ingenious Hypotheses, have not been able to come to any Agreement among themselves.

Final Cause.

All Authors agree, that the necessity that Women have for some extraordinary Supply to recompence the Expence, and to support them under it during the Time of Gestation, was the final Reason why this Redundance at other times was given to them.

Fabulous Qualities.

But this is the only Point wherein they are generally agreed. Some, not content with that Occasion alone, will have the menstruous Blood to offend in Quality more than Quantity; which they argue from the Pain it gives many Women in the Evacuation. They say likewise, That the Malignity of them is so great, that they excoriate the Parts of Men by the mere Contact; that the Breath of a menstruous Woman will give a permanent stain to Ivory, or a Looking-Glass; that a little of this Blood dropp'd upon a Vine, or Corn, or any other Vegetable, they become sterile, or blasted; that if a Woman with Child be defil'd with the *Menfes* of another Woman, she miscarries; that if a Dog tastes them he runs mad; if a Man, he becomes epileptick; which, with abundance of other such Fables, tho' recounted by many grave, and some great Authors, I reject,

as needing no Refutation, and have only recited them to shew what things have been superstitiously taken up upon Credit, without sufficient Examination, by Men of great Authority, who have been prevail'd upon to believe what the Women at all times would laugh at. Another thing likewise, which we shall not bestow much time upon, is, the suppos'd Dominion of the Moon over the Bodies of Women in this Case: A Fancy which anciently was the universal Opinion, tho' common Experience, with a very little Reflection, might have shewn the Weakness of it. For if this Purgation had been caus'd by any Influence of the Moon, then all Women of the same Age and Temperament should be purg'd according to the same Periods and Revolutions of the Moon at the same time, which daily Experience shews to be false.

*Dominion
of the
Moon.*

There are two Opinions however, that are argued with a great deal of Strength and Reason, both which allow the Quality of the Blood to be innocent, but they differ about the Reason of its Issue. Dr. *Bohn*, and of late Mr. *Freind*, a learned ingenious Gentleman of *Oxford*, maintain that this Flux is the result of a mere *Plethora*, and to be evacuated only for Relief against the Quantity.

*Hypothesis from a
Plethora.*

Others are of Opinion that this Evacuation is owing to a Fermentation rais'd at that time, and that the Eruption of the Blood in those Parts is the Effect of an Effervescence, or Ebullition of the Blood. This Opinion has been maintain'd by many, but its chief Supporters are, the learned Dr. *Charleton* here, the ingenious Dr. *Bayle* Professor of Physick at *Tholouse*, and Dr. *De Graaf*, whom we have had so frequent Occasion to mention,

Fermentation.

The two first of these suppose a Ferment peculiar to the Women, which produces this Flux,

and affects that part only, or at least principally. *De Graaf*, less particular in his Notion, only supposes an Effervescence of the Blood, rais'd by some Ferment, without assigning how it acts, or what it is.

Mr.
Freind's
Hypo-
thesis.

Mr. *Freind* (who has sustain'd the Cause of a *Plethora* with the greatest Clearness and Strength) supposes that this *Plethora* arises from a Coacervation in the Blood-Vessels of a Superfluity of Aliment, which he thinks to remain over and above what is excreted by the ordinary ways, and that Women have this *Plethora*, and not Men, because their Bodies are more humid, and their Vessels, especially the Extremities of them, more slender, and their manner of living generally more unactive than a Man's, and that these things concurring, are the Occasion that Women do not perspire sufficiently to carry off the superfluous alimentary Parts, and that therefore this Overplus must be retain'd in the Vessels, till it be accumulated in such Quantity as to distend the Vessels, and force its way through the Capillary Arteries of the *Uterus*. And he thinks this Discharge to happen in that Part, rather than in any other, because it is more favour'd by the Structure of the Vessels, the Arteries being very numerous, and the Veins very sinuous and winding, and therefore more apt to retard the *Impetus* of the Blood, and consequently, in a *Plethorick* Case, to occasion a Rupture of the Extremities of the Vessels, which may last till by a sufficient Discharge the Vessels are eas'd of their over-load.

This I take to be the Substance of that learned ingenious Gentleman's *Hypothesis*, from whence he very mechanically, and very philosophically, deduces a *Rationale* of the Symptoms.

Plethora
not the
Cause of
Menstru-
ation.

To this *Hypothesis* I could subscribe, did not many Observations convince me that there is no such *Plethora*, or at least, that it is not necessary

ry

ry to *Menstruation*: For if the *Menses* were owing to a *Plethora* so accumulated, the Symptoms would arise gradually, and the Heaviness, Stiffness, and Inactivity, (necessary Symptoms of a *Plethora*) would be felt long before the Absolution of the Period, and Women would begin to be heavy and indispos'd soon after their Evacuation, and the Symptoms would increase day by day. But this is contrary to all Experience, and many Women, who have them regularly and easily, have no warning, nor other Rule to prevent an indecent Surprise, than the Measure of the Time; in which some that have slept, tho' otherwise modest and careful Women, have been put to such Confusions and Shifts, as would not consist with the Notice that a *Plethoric* Body would give.

But even in those who are difficultly this way purg'd, the Symptoms, tho' very vexatious and tedious, do not make such regular Approaches as a gradual Accumulation necessarily requires: If we consider what violent Symptoms will come on in a Day, or an Hour, we shall be extremely puzzled to find out the mighty Accession of Matter that should in an Hour or Day's time make such great Alterations. According to this *Hypothesis*, the last contributes no more than the first, and consequently the Alteration shou'd be no more sensible, excepting the bare Eruption: But it is neither my Business nor Intention to combat any Man's Opinion. The learned Dr. *Bohn* has said a great deal; and Mr. *Freind* has rendred this Opinion so plausible, that I wish it were true; and must do him this Justice, that his is the first Account of the periodical Revolution of the *Menses* that I have met with, philosophically contriv'd, and like an understanding Enquirer. Most others have either given trifling or precarious Solu-

No
gradual
Accumulation of
Matter.

Mr.
Freind's
Hypothesis
plausible.

ons, or pass it over as a Difficulty beyond human Understanding.

*Fermen-
tation not
proved.*

The other *Hypothesis* of a Fermentation or Effervescence of the Blood has had much worse Luck : For either it has been slubber'd over as a thing whereof the Fact was certain, but the Reason inscrutable, as *De Graaf* has left it ; or establish'd upon an imaginary Ferment, which never was prov'd to exist, and perhaps never will be.

*No Recep-
tacle for
Fermen-
tation
assigned.*

The sudden Turgescence of the Blood gave them reason to think, that it arose from something till then extraneous to the Blood : But where to find that they did not know ; and therefore had recourse to the Parts suppos'd to be principally affected, and feigned an imaginary Ferment, which no anatomical Enquiry could ever shew, or affirm any reasonable Receptacle for, nor no Reasoning necessarily infer : But on the contrary, both *Autopsy*, and Reasonings from it, conclude against it ; since neither the fermenting Matter it self, the Organs by which it should be secreted, nor the Place where it should be repositied, are to be found.

*Operation
of Emme-
nagoges.*

However, the Heat which accompanies the Turgescence of the Blood, shews that it is not merely *plethorical*, but that there is an extraordinary intestine Motion at that time ; which is likewise confirm'd by the Operation of most Medicines conducing to that end, which are most of them such as will give a fermentative Motion to the Blood ; or such as will stop an extraordinary Flux of Humours another way, which is one of the ordinary Causes of a defect of the *Menses*. For this Reason *Vitriolick*, and other *Restricting Medicines*, which are sometimes given with Success in Obstructions, as they are call'd, are not strictly to be reckon'd among the *Provocants*, but to the number of those that by rectifying the Tone of the Stomach and Intestines, stop extraordinary Fluxes

Fluxes that way, and by degrees mend and invigorate the Blood, which by fuch Difcharges is impoverish'd.

The Suddennefs and Violence of the Effervescence, which is fuch as to break out at the Noſe, *Hæmorrhoids*, Lungs, Stomach, Eyes, and indeed almoſt any part of the Body, ſhews, that whatever is the Cauſe, it is ſomething very active, and that may be introduc'd in quantity in a ſhort time into the Blood, and conſequently that it muſt be ready gather'd in ſome Receptacle, where, while it was contain'd, its Action was prohibited. For, if it had been ſcatter'd in the Blood it ſelf, it muſt either have acted conſtantly and regularly, and then no ſuch critical Evacuation could happen; or it muſt exert its Power gradually according to its increaſe in the Blood, and ſo the Symptoms muſt have approach'd in the ſame manner as we have argued againſt a *Plethora*.

The only Humour which I can find in the Body, ſo circumſtantiated as this *Phænomenon* ſeems to require, is the *Bile* contain'd in the *Gall-Bladder*. This is a Liquor that probably may have divers Uſes, and produce many Effects in an Animal Body, which are yet unobſerv'd: But univerſal Experience agrees that it is capable of raiſing Diſorders, or Fermentations extraordinary, whenever it inſinuates it ſelf in quantity into the Blood. And as it is contain'd in a peculiar Receptacle, which ſeems not to admit of a conſtant Iſſue, it may be there reſerv'd, till in a certain Period of time the Bladder becoming turgent and full, thro' the Compreſſion of the incumbent *Viſcera*, it emits the Gall, which, by the way of the *Lacteals* inſinuating it ſelf into the Blood, may raiſe that Effervescence, which occasions the Aperture of the uterine Arteries.

The neceſſity of a Receptacle prov'd from the ſuddenneſs of its Symptoms.

Gall-Bladder the Receptacle, and Bile the Ferm.

Farther
prov'd by
Observa-
tions on
bilious
Constitu-
tions.

All Observations agree, that Persons of a bilious Constitution are either more plentifully, or more frequently purg'd this way ; and I my self have observ'd divers bilious Persons, who tho' obnoxious to a *Fluxus Alvi*, which kept them far from a *plethorick* Condition, were however vex'd with a *menstruous Hypercatarsis* : And it is observable, that Men of bilious Constitutions are more frequently troubled with the Piles than others ; and that Distempers manifestly bilious are attended with Symptoms resembling those of Women, who labour under difficult Menstruation : Their Pulse increases, their Heads ache, they vomit, they have colical Pains, and feel a general Fulness and Stiffness, and are relieved in great measure by bleeding, from most of these Symptoms, which a critical Discharge carries off.

Women abound
with Hu-
mours of
all sorts
more than
Men.

It may be objected, that Men abound with Bile as well as Women : But to that Objection I take the Liberty to answer, that they do not, nor with any other Humour that is permanent in the Body, *Semine excepto*. For as in Men the Pores of the Body are more open, and carry off more of the serous part of the Blood, which is the Vehicle of all the other Humours ; so consequently, a greater part of each of them is discharg'd thro' them, than in Women ; in whom the Superfluity must continue to circulate with the Blood, or be gather'd into proper Receptacles, which is the Case of the Bile.

Why not
these Dis-
charges in
Men.

Why not
in Brutes.

The same Argument which holds, why Menstruation should not belong to Men, will hold likewise in Brutes ; whose Pores are manifestly more open than those of Women, as appears by the Crop of Hair which they bear ; for the Vegetation of which, a larger Cavity, and a wider Aperture of the Glands is necessary, than where no such thing is to be produc'd. Yet there is a difference

difference in this Point between the Males and Females, even in them: These latter have their *Terms*, tho' not so often as Women, nor in the same Form or Quantity, though Blood sometimes be the result of them.

No Anatomist, that I know of, has yet offer'd a satisfactory Reason, why a sort of Bile, more thin and acrimonious, should be separated into a Receptacle by it self, and not constantly discharged, as that of the *Porus Bilarius* is. They have generally referred it for the use of Chylification; but besides that it appears to be no proper Ingredient of so sweet a Juice as Chyle is, they have but precariously affirm'd it only, and have not given us any necessary, nor to me convincing Arguments, of its Instrumentality in that Case; nor indeed can I help saying, that they have brought it without necessity into an Operation which might be compleat without it.

I think it unnecessary to apply this Hypothesis to the several *Phænomena* of the *Menfes*, whether in a natural, regular, or a diseased Case. The Solution of particular *Problems*, relating to this part of the animal History, flows very readily and naturally from it; and whatever may be urg'd for the Power of a *Plethora*, or of any particular Ferment, may be apply'd without any straining to this. The only Difficulty is, whether the Bile be a sufficient Instrument to produce these Effects; and if it be, whether it does get into the Blood, as I conceive. I shall not swell this Work with Arguments to prove these two Points; for one I think is on all Hands confess'd, and the other I think reasonable to be believ'd: What I deliver, I lay down problematically, with free Liberty to all Mankind to examine it impartially, and shall be as ready to receive the Truth, however contrary to my present Sentiments, as I am now to impart my own Opinion.

C H A P. XXIV.

Of Generation.

*The Cause
of Gene-
ration not
sufficiently
accounted
for.*

THE Organs of Generation have been already describ'd: But there remain some Doubts about the efficient Causes of it, which are not sufficiently adjusted. It is agreed on all Hands, that there are in the Ovaries of Women little Eggs.

These Eggs, most modern Anatomists, and the most able till very lately, have maintain'd to be the material and formal Rudiments of the Body of the future Man, which the Seed of the Male did only impregnate and vivify. But that the Ovary it self did, before Impregnation, formally and materially contain the Body of the Man, tho' it could not germinate and increase, till rendred prolifick by the Seed of the Male.

*Dr. Har-
vey's Opi-
nion con-
cerning it.*

This Opinion was first broach'd, and laid down with Strength of Reason, by our great Countryman Dr. *Harvey*, in his Book *De Generatione Animalium*. It procur'd almost universal Assent from the Writings of that Author, and seem'd perfectly establish'd by *De Graaf*, till the Microscopical Observations of Mr. *Lewenboek* grafted somewhat upon it, and took something from it.

*Mr. Lew-
enboek's
Opinion.*

That ingenious Gentleman, to whose happy Curiosity we are oblig'd for abundance of useful Discoveries, pretends by his Microscopes to have discover'd in the Seed of the Male, as well human, as of divers sorts of Animals, innumerable extremely minute *Animalcules*, moving with great Vigor and Celerity in the Fluid; which he maintains to be Animals of the Species of that Creature whose the Seed is.

*Animal-
cula in
Semine.*

The Communication of his Observation has mov'd the Curiosity of abundance of other learned Men to make the same Enquiry, with such Glassees as he has describ'd, and by their own Acknowledgments they appear to have done it with the same Success. I have had the same Curiosity, and must confess that the Appearance answered beyond my Expectation, and came up to all the Representations that had been given of it.

The *Animalcules* (notwithstanding the very small compass the Eye can take in at once thro' such a Glass) appear'd in prodigious Numbers, moving with great Velocity, diversly, and, as it seem'd, arbitrarily : Their Figure was exactly like that of *Tadpoles*, and they appear'd in the Liquor black like them, and about the Size they are figur'd in the *Philosophical Transactions*, Num. 284. where a Description of them more at large may be found ; what I have here said being sufficient for my purpose.

This Discovery has been the Foundation of a *New Theory of Generation* ; in which this *Animalcule* is suppos'd to be the entire *Fœtus*, and the *Ovum* before-mention'd to be only a kind of *Matrix*, and to afford a *Pabulum* to the *Embryo*. For notwithstanding this Discovery, the Existence of true *Ova* in viviporous Females is not contested, nor is it indeed contestable.

I should very readily go into this latter *Hypothesis*, if I did not meet with some insuperable Difficulties (to me at least they appear such) which equally press either *Hypothesis*. The first supposes the Animal to be entirely included in the *Ovum* before Impregnation, and that the Seed of the Male does only vivify, or give Life and Power of Vegetation, as we said before. The latter affirms the *Embryo* to be entire, perfect and alive in the Seed of the Male ; and like the Seed of a Plant, to want only to be cast into a *Soil* or *Matrix*,

Farther confirm'd by Observation.

Their Appearance.

The Animalcule the entire Fœtus.

These Hypotheses under Difficulties.

trix, proper for its Increase or Vegetation, which they suppose the *Ovum* to be.

Mongrel-
Breeds, an
Objection
against it.

But neither of these *Hypotheses* accounts fairly and fully for mix'd Generation: For besides the vast variety of Mongrel Dogs, begotten betwixt *Sires* of different Species, there have been abundance of Observations of Mixtures of Animals of more remote kinds; such as between a Pheasant-Cock and a Hen; a Bull and a Mare, which has been often enough observ'd to procure a particular Name, and is call'd a *Gimar*; a Cat and a Rat; (of which however improbable it may seem, there is an honourable Family that can produce abundance of Witnesses;) a Buck-Rabbit and a Guinea-Sow; of which lately I have had a very credible Account. But the most common of all these Animals of mix'd Breed, (except the Dogs) is the Mule, begotten by an Ass upon a Mare.

The Fœ-
tus not
following
the Species
of the Mo-
ther, shews
the form'd
Animal
not to be
contain'd
in the O-
vum.

If the *Ovum* contain'd the form'd Animal, then the *Fœtus* ought to follow the Species of the Mother, let the Sire be what it will: Because he contributes nothing but means of Life and Vegetation, the Animal being determin'd beforehand. And the kind should be as certain as in Plants; where, let the Seed be thrown into what Soil soever, that does not alter the Species of the Plant, tho' it may the Growth and Vigour of it.

The same
Objection
to be urg'd
against A-
nimalcula
in Semine.

The same Objection lies yet stronger against the *Animalcules*. For if that *Hypothesis* be true, the *Sperm* of an Ass is full of little Asses; and they being nurs'd by a Mare should never make Mules of them, because the Species is pre-determin'd, and the Creature not only form'd, but living. I might perhaps as reasonably object, the Similitude that the Children of the same Parents bear to their Ancestors; some to the Father's Line, and some to the Mother's; which plainly shews, that to the Determination of the Species, both Sexes concur; and that sometimes one may prevail, and sometimes

sometimes the other ; which could not be, if both these *Hypotheses* were strictly or absolutely true. I know some endeavour to get over this Objection, by fancying that the different *Matrix* may have so much Effect, as to alter the Figure of the Animal so far, as may account for these mixt Appearances. But this is so poor, so unphilosophical a shift, that it is not worth an Answer ; and they might with as good Authority persuade me, that an Orange-Tree transplanted from *Sevil* to *England* would bear Apples ; and so *vice versa*. It is a common Practice in Gardening, to graft one Fruit upon another Stock : But the Fruit still follows the Species of the Graft or Cyon, and bears like the Parent-Tree, not the Stock it grows upon.

These Difficulties render both these *Hypotheses* unsatisfactory to me ; and however old and exploded the Opinion of a *Plastick Power* on both sides be, I must however embrace it, even tho' I know not exactly wherein it lies ; at least till I meet with somewhat more sufficient to resolve my Doubts than hitherto I have done.

It is however agreed, that tho' the *Ovum* of the Female does not formally contain the Animal, yet in Impregnation that it is a *Causa sine qua non*, and that Generation cannot be without an Egg rightly dispos'd ; and upon that Concession (which I think is at this time universal) I shall proceed to examine some of the principal *Phænomena* of Generation, and the requisite Condition of Fœcundity, without concerning myself farther with the *Animalcules* of either side ; except only to observe, that the Existence of a form'd Animal in the *Ovum* has never been prov'd, but suppos'd only from the Analogy it is imagin'd to bear to the Seed of Plants, in some of which the Figure of the Plant has by the Microscope been discover'd. The other *Hypothesis* seems to stand up-
on

*A form'd
Animal in
the Ovum
not prov'd.*

The seeming Animals may be only Particles of a mix'd Fluid in motion.

on the Foot of *Autopsy*, but Reason, as we have observ'd, seems to be against it: And it is not impossible but that these seeming Animals may be nothing more than some large Particles of a mix'd Fluid, whose Motion and different Figure the Microscope discovers to our Eye, while yet the minuter Parts will not discover themselves, even that way. But we leave these things to the Arbitrement of the Learned.



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MDCCCL.



A NEW
S Y S T E M
O F
A N A T O M Y.

B O O K II.

*Of the Parts of the Thorax or Middle
Venter.*

C H A P I.

Of the MAMMÆ or BREASTS.

ON the outside of the *Thorax*, besides *Mammæ*, the common containing Parts which have been already spoken to, appear the *Breasts*, one on each side. In Women, of considerable Eminence and Use; in Men, as they are of little Use, so they make no great Figure: And therefore we shall take our Description of these Parts from the other Sex.

About the time of Puberty or Eruption of *Time of* the *Menses* the Breasts begin to swell, and grow *Augmen-* prominent, probably from a greater Afflux of *tation or* Humours at that time, which not only fill the *Decrease.* Vessels, but dilate the Substance of them; which
Opinion

Opinion is confirm'd by their shrinking when Age renders them unfit for Procreation, and their *Menses* desert them.

*Magni-
tude.*

Their Magnitude is various and indeterminate, biggest in times of Gestation and Lactation, at which times they seem to be more spongy and compressible; at others plump but firm, especially in Women that have never been pregnant.

Figure.

They resemble in Figure the large Section of a Globe, having in the middle a Prominence terminating in a blunt Point, which is the *Papilla* or *Nipple*; which in Virgins is of a fresh, pale, reddish Colour; in those that give suck, bluish; which in age turns to a blackish. In the Extremity of it are divers Perforations or Holes, to which reach the *Lacteal Tubes*.

Papilla.

Areolæ.

Round about the Nipple is a pale brownish Circle, which is call'd the *Areola*, which is likewise in different Ages and Circumstances, of different Colours.

Substance.

The internal Substance of the *Mammæ* is compos'd of Glands intermix'd with Globules, and Vessels of Fat.

Glands.

The Glands are of different Sizes, and whilst Vigour lasts, look whitish: In Age they turn yellow.

Vessels.

The Breasts receive Arteries and Veins from the *Subclavian*, which run under the *Sternum* till they come just under the *Mammæ*, where they pass outwards to them. And besides these, they send many Branches which inosculate with other Branches of the *Hypogastricks*. There are likewise other Blood-Vessels, which come to them from the *Intercostals* and *Thoracics*. All the Vessels are much larger, and more conspicuous in those that give suck, than in other Women, as is manifest even upon external Inspection.

Nerves.

Their Nerves come from the fifth Pair of the *Spine*, and from a *Plexus* about the *Clavicles*. Be-

sides

sides which, there are others which have not been distinctly traced to their Originals, neither perhaps is it material to trace them.

Dr. *Wharton* ascribes to them a great number of *Lymphæducts*, which upon the Udder of a Cow are very conspicuous, but are not easily traced deep into the Substance, tho' tis probable they arise from thence, and exonerate themselves into the *Thoracic Duct*. *Lymphæducts.*

Of all the Vessels belonging to this Part, the most considerable are the peculiar ones, the *Lacteal Pipes* or *Tubes* which arise very slender, but meeting together form divers Trunks, which end in the *Papillæ* or *Nipples*. These *Tubes* are not every where of equal Capacity, but being in some places more, in some less dilated, form a sort of *Cells*, which seem contriv'd to hinder the spontaneous Efflux, and to create a Necessity of sucking to fetch it out; which notwithstanding is not always necessary, for the Milk will frequently run of itself out of a small Breast that has been much suck'd. Besides this Contrivance, Nature has fram'd *Anastomoses*, or Communications between these Ducts, to obviate the Inconvenience that might arise from any casual Obstruction of one or more of them. *Tubuli Lactiferi.*

Of the Concurrence of these *Tubuli*, or *Pipes*, is the Substance of the *Papilla* in great measure form'd, amongst which is interspers'd a glandulous Substance, which serves to keep them from compressing each other, and with it are intermix'd abundance of Fibres drawn from the external *Teguments* of the *Papillæ*, by means of which the *Lacteal Tubes* are constring'd, and the motion of the Milk is modify'd. *Glandulæ & Fibræ Papillares.*

Some have imagin'd particular Ducts from the *Thoracic* to the *Mammæ*, but in my Opinion without any Occasion, and 'tis probable that these

Ducts

Ducts never had any Existence, but in the Imagination of fanciful Men.

Ductus
Adiposi.

Besides these Vessels there are abundance of *Fatty Globules*, which some would have only to serve to fill up the *Interstices* of the Glands, and to keep them moist: But I must needs agree with *Malpighius* that they have a much nobler Use.

Their Use.

In all Milk the Butter and Oil of it is a great part, and indeed Milk seems to be nothing else but Water and Oil united by the Artifice of Nature, perhaps by the Intervention of peculiar Salts, which Milk itself, however sweet at first, does after a little standing discover to be plentifully in it; and we find that by the Mediation of Salt, Water and Oil may be so mixed, as very much to resemble Milk, tho' we cannot come up to the Mechanism and make it.

C H A P. II.

Of the Diaphragm.

Dia-
phragm.

THE DIAPHRAGM, which divides the *Abdomen* from the *Thorax*, is a Muscle of great Importance, upon the Score of its use in Respiration.

Situation.

It is situated obliquely, being on the fore-part connected to the *Sternum* and *Ribs*, and on the hinder to the *Vertebræ* of the Loins, which renders its Position something slanting.

Figure.

Its Figure is almost circular, varying only so much from it, as the Figure of the Cavity of the Body in that part, and its two Processes, which it sends to the *Vertebræ* of the Loins unavoidably occasion it to do.

Muscles.

It consists of two Muscles, (or as some will have it, of three, and perhaps not mistakenly).

The

The foremost of the two is thin and broad, extended from the *Sternum* on each side to the spurious Ribs and *Vertebræ*.

The hinder is thick, and has a very fleshy Belly: It arises from the *Vertebræ* of the Back by two Processes, which give room for the Division of it into two Muscles. The Right, which is the longest, springs with a triple Tendon from the two or three first *Vertebræ* of the Loins, and the last of the Back. The left, which is shorter, and sometimes simple, sometimes double, arises from the last of the Back and the first of the Loins, and sometimes from one only of them. These Originations, when nearly inspected, appear to be tendinous. The Tails of these Muscles end in a tendinous *Centre*, which is perforated towards the right side for the *Vena Cava*; towards the left backwards, its fleshy part gives way to the *Gula*: The descending Trunk of the great Artery, *Ductus Thoracicus*, and *Vena Azygos*, pass between its two inferior Processes.

The Veins of the *Diaphragm* are pretty large, *Veins.* and go directly to the *Cava*, between its entrance into the *Thorax* and the *Liver*, where two pretty large Branches from each side of the *Diaphragm* enter it.

It has Arteries immediately from the *Aorta*, *Arteries.* and sometimes from the *Cæliack*, and a few small Twigs from the *Lumbals* and *Adipose*.

Verheyen mentions two Arteries and two Veins of his own Discovery, whereof the right Artery and the two Veins are Branches of the *Subclavians*. The left he dares not pretend to have sufficiently trac'd, but says, that in the *Diaphragm* the Arteries and Veins inosculate with the aforementioned of their kind, and that the Veins receive some Branches in their return from the *Diaphragm*, from the *Pericardium* and *Mediastinum*.

It receives a pretty large Nerve from the *Plexus Cervicalis* on each side, and from the second Pair of the *Vertebræ*, which from a triple Root form a considerable Branch, which distributes it self on each side through the whole Body of the *Diaphragm*.

Motion.

In Inspiration, the *Diaphragm* descends towards the *Abdomen*, which is its proper Motion, which as a Muscle is Contraction. In Expiration it is relaxed, and with the *Costæ* drawn upwards, and makes a Concave-Convex Figure; the Concave side towards the *Abdomen*. By this alternation of Posture, it enlarges the Cavity of the *Thorax* in Inspiration, of the *Abdomen* in Expiration. By this reciprocal alternative Motion, it serves as well to draw down the Ribs, and enlarge the *Thorax*, as to compress the *Abdomen*, and that way to assist to the Expulsion of the Contents of the Stomach and Intestines, and to the Exclusion of the *Fœtus* in Parturition.

C H A P. III.

Of the PLEURA and MEDIASTINUM.

Pleura.

THE PLEURA is a smooth Membrane, lining the whole inside of the *Thorax*, and consists of a double Membrane, between the Duplication of which pass the *Vena Azygos*, and the Intercostal Arteries and Nerves.

It has Arteries and Veins from the *Intercostals*, *Mammaries*, and *Diaphragmaticks*, and Nerves from the *Intercostals*.

Use.

It serves to line the inside of the *Thorax*, and render it smooth, that the Lungs may not be hurt in their Motion.

Mediastinum.

Out of a Duplication of this is form'd the *Mediastinum*, which divides the *Thorax* longitudinally,

nally, including betwixt its two *Lamellæ* the Heart, and affording Passage to the *Oesophagus*, *Vena Cava*, and *Stomachic Nerves*.

It has Arteries and Veins from the *Mamma-Vessels*, *ries* and superior *Diaphragmatics*, and some Branches immediately from the great Arteries and Vein, which have been call'd the *Mediastinæ* as proper to it.

Its Nerves come from the *Stomachics* and *Nerves*, *Diaphragmatics*, which in their Passage through it bestow some Branches upon it.

It has *Lymphatics* which tend to the *Thoracick Lymphæ-Duct*. But of this more when we speak of the *ducts*. *Pericardium*.

C H A P. IV.

Of the THYMUS.

THE THYMUS is a Conglomerate Gland, *Thymus*, situate in the upper part of the *Thorax* just below the Division of the *Subclavian Arteries* and *Veins* in a *Fœtus*, and in Children new born, large, soft and white, abundantly bigger than in Adults.

It has Arteries and Veins from the *Carotids Vessels*, and *Jugulars*, and Nerves from the *Par Vagus*. Over the Surface of it run divers *Lymphatics*, but whether they come from the Interior Substance of it, is not quite so plain in Fact, as it is from Reason credible.

It is often found with a Milky Juice in new-born Children; its *Lymphæducts* have no *Valves* in them; for by injecting a Liquid into the *Ductus Thoracicus*, it will pass into the *Lymphæducts* of the *Thymus*; the like has been observ'd by injecting Wax. The *Thymus* has been therefore thought to be a kind of *Diverticulum* to the *Chyle*

in the *Thoracick Duēt* when over-charg'd, as well as to receive the *Lympha* from the adjacent Parts, in order to transmit it to the *Thoracick Duēt*. The space it takes up in the Cavity of the *Thorax* of a *Fetus* must be very much crouded when the Lungs become distended by Respiration; whence it is the neighbouring *Lymphatick* Glands (as those about the *Subclavian*, and the internal *Jugular Veins*) are larger in the Adult when the *Thymus* is less; and *vice versa* less in the *Fœtus* (in proportion) when the *Thymus* is largest.

C H A P. V.

Of the HEART and PERICARDIUM.

Heart.

THE HEART is a Muscle situated in the middle of the Thorax, into which the two great Veins, (*viz.* Cava and Pulmonaris) discharge themselves by the Mediation of its Auricles, and from whence the Aorta and Pulmonary Arteries arise, and by its reciprocal Action of Constriction and Dilatation is the main Instrument of the Circulation of the Blood, and the Foundation of all Vital Action.

Capsula.

It is included in a Capsula or Pouch which consists of a double Membrane, the Inner arising from the Tunicks of the Vessels of the Heart, and the Outer from the *Mediastinum*.

Figure.

Its Figure is like that of the Heart which is Conoid, and it embraces the Heart laxly, allowing room for its Pulsation.

Conne-
xion.

In Human Bodies, and in them only, it is connected below, to the *Tendinous* part, or Centre of the *Diaphragm*, whereas in Brutes it is loose.

Externally it adheres to the *Mediastinum*, and in the superior part to the Veins and Arteries of the Heart, for the passage of which it has several Perforations.

It

It receives Arteries and Veins from the *Media-Vessels*. *stins*, and from the superior *Diaphragmatics*, in the upper part, and in the lower from the *Phrenick*. Its Nerves come from the neighbouring Branches of the *Par Vagum*. And it has likewise some *Lymphatics* which empty themselves into the *Thoracic Duct*.

Its Use is suppos'd to be the defence of the *Use*. Heart, as likewise to contain a soft serous Humour, which may serve to lubricate and moisten the Heart.

This latter Opinion has been somewhat controverted of late by some who think that this Water is not naturally there, but that it is separated forcibly during those Convulsive Agonies which usually supervene in *Articulo Mortis*.

This Opinion is grounded on the Difficulty that Anatomists have met with in tracing its passage: For it does not yet plainly appear which way it comes, nor how it is carried off: And it is hard to imagine that the quantity always remains the same, or that it could do so without Putrefaction: Yet the Passages through which it should be shifted, not being yet demonstratively discover'd, I must be contented to leave it, as I find it, *sub judice Litem*.

The Doubt has been as great likewise whence this Humour was separated. The most recent Opinion, and the most probable is, that it is secreted by some Glands about the Basis of the Heart. However it seems to me to be necessary by its Lubrication to prevent any Inflammation that might probably arise from the dry Friction of the Heart and its *Capsula*. But these things are deliver'd not dogmatically but Problematically, and left to future Inquiry.

The Figure of the Heart it self is that of a Cone or Pyramid revers'd: The upper and broader part

of which is call'd the Basis, and the lower the Cone or Point.

*Magni-
tude.*

Its Magnitude is indeterminate, and differing in several Subjects according to their respective Dimensions. However its ordinary length is about six Inches, and its Breadth at the Basis betwixt four and five, and the whole Circumference about fourteen.

Situation.

It is situated about the middle of the *Thorax*, between the two Lobes of the Lungs; and is fastened to the *Mediastinum* and *Pericardium*, and supported by the great Blood-Vessels to which alone it is immediately connected, being for the convenience of its Motion disengaged from any other Impediments.

*Mem-
brane.*

It is cover'd with a thin Membrane, which about the Basis is guarded with Fat.

ib. a. a.
Ventricles.

It has two great Cavities or Ventricles of Capacities somewhat unequal: The right being of the two, larger, and capable of containing between two and three Ounces of Blood, the left not containing so much by about half an Ounce.

App.
Tab. i.
Fig. iii.
E. F.
Septum.
ib. G.

The *Ventricles* are divided by a thick fleshy Partition, consisting of the same Muscular Fibres that the *Parietes* of it do, and is call'd the *Septum*, the Figure of which is Concave towards the left Ventricle, and Convex towards the right. Between these Ventricles there is no immediate Communication. But the Blood circulates thro' the Lungs to arrive at one Ventricle from the other.

Parietes.
App.
Tab. i.
Fig. iii.

The *Parietes*, or Sides of these Ventricles, are of a thickness and strength very unequal; the left being much thicker than the right, because of its Office, which is to force the Blood through all parts of the Body; whereas the right drives it through the Lungs only, and is therein greatly assisted otherwise, as shall in proper place be shewn.

In these Ventricles are divers small Muscles deriv'd, and as it were detach'd from the *Parietes* of the Ventricles, and connected by *Tendinous* Extremities to the *Valves* of the Heart, and are by Authors diversly call'd *Columnæ Carneæ*, *Lacertuli*, &c. and these little Muscles or *Columnæ Carneæ*, being fastned to the *Parietes* of the Heart on one side, and the *Tricuspid* and *Mitral Valves* on the other, do by their Contraction in the *Systole* of the Heart draw out the *Valves*, and by that means not only shut up the Orifices of the Veins, but, as the ingenious Mr. Cowper observes, *More exactly close the Ventricles in their Systole, than they could have been, had they been smooth.*

These *Ventricles* are capp'd or cover'd each with an *Auricle*: These *Auricles* are two Muscles consisting of a double order of fleshy Fibres, as the *Ventricles* of the Heart themselves do, whose Proportion they seem exactly to follow, both as to Strength and Capacity, and in the Tendons of which they terminate. These *Auricles* are mov'd regularly after the manner of the Heart, the order only revers'd, that is, they are contracted whilst the Heart is dilated, and dilated whilst the Heart is contracted.

These Vessels which proceed from, and terminate in the Heart, and its Auricles are two Arteries, the *Aorta* and the *Pulmonary Artery*, which have their Origination from the Ventricles of the Heart: The *Aorta* from the left; and the *Pulmonary* from the right: And two Veins which terminate in the Auricles of the *Cava*, or great Vein in the right; and the *Pulmonary Vein* in the left.

At the respective Orifices of these Vessels are placed *Valves*. At the Orifice of the Arteries, within each Artery are fixed three *Semilunar Valves*, that is, three Membranes of a *Semilunar* Figure,

Columnæ Carneæ.
ib. Fig. i.

Auricles.
Tab. xi.
b. c c.

Vessels common.
ib. D. HI.

Valves.
App.
Tab. ii.
Fig. iii,
iv, v, vi.
Semilunar.
nar.

Tricuspid.
App.
Tab. i.
Fig. i.

Figure, which being expanded close the Orifice of the Artery, and hinder the Relapse of the Blood into the Heart at the time of its Dilatation. At the Mouth of the right Ventricle of the Heart, just at its Juncture with the Auricle, are placed three other *Valves* call'd *Tricuspides* from their having three Points, which are fastned by tendinous Fibres to the *Columnæ Carneæ* before-mention'd, and upon the Contraction or *Systole* of the Heart close the Orifice of it, and hinder the Blood from recurring into the great Vein. The same Office the *Valvulæ Mitrales* (which are in number but two, and so call'd from their resemblance of a Mitre) do at the *Exit* of the Left Ventricle, stopping the return of the Blood into the *Pulmonary Vein*.

Mitral.
ib.

Substance.

The Substance of the Heart it self is intirely Fleshy or Tendinous, consisting of a continued Series of *Muscular Fibres* variously contorted or wound up, and ending at the Orifices of the respective Ventricles, and there forming the Tendons, by which means they make the Heart a double Muscle, or as some think two Muscles.

Strait Fibres.
ib. Fig. v.

As soon as the proper Membrane is taken off, there appear, on the outward Surface on the right Ventricle, some slender strait Fibres tending to, and ending in the *Basis*.

Spiral Exterior Order.
Fig. xi.

Immediately under these lyes a double order of *Spiral Fibres*. The Exterior Order of these ascend obliquely from the *Septum Cordis* to the *Basis*, forming thereby a sort of *Helix* or *Cochelea*.

Interior.

The Interior Order takes a Course just contrary to those which they lye under, and springing from the right side, wind obliquely towards the left, incompassing both *Ventricles*, and ending in the *Basis* on the left side, and forming a *Helix* of an Inverse Order.

These Fibres are best discern'd in the unravel-
 ling a Sheep's or Ox's Heart after they have been
 well boyl'd. In which as soon as the Membrane
 of the Heart is taken off, the first Order readily
 appears, the Fibres of which do not all of them
 reach from the *Basis* to the *Cone*, but some of
 them taking a much shorter turn, as soon as
 they have measur'd about half the Circumfe-
 rence of the Heart, turning about with a kind of
 an Arch, go with an oblique Course to the Ten-
 don of the other side and Ventricle.

*Method of
 discove-
 ring the
 Fibres.*

After these Fibres are remov'd, those of the
 left Ventricle appear, among which are no strait
 ones, but first appears a Series of Fibres run-
 ning spirally to the left, under which, as in the
 right Ventricle, lye another Order running just
 the contrary way. These Fibres do not, within
 the right Ventricle, extend only to the outward
Paries but encompassing the whole Ventricle,
 make the *Septum* appertain peculiarly to, and be
 a part of the left Ventricle. Many of these Fi-
 bres, instead of terminating as the rest do in the
 Tendons of the *Heart*, run inwards and form the
Columnæ Carneæ, of which we have spoken be-
 fore. Others reaching down to the *Cone* are
 wound about it, and form that Circle which is
 call'd the *Centre*.

The Structure of the Auricles is so like that
 of the Heart it self, that it needs no particular
 Description.

The Heart has its proper Blood-Vessels, Two
 Arteries springing from the Entrance of the *Aor-*
ta, and one larger Vein with one or two lesser,
 all which from their encompassing the Heart are
 call'd *Coronarix*.

*Vessels
 proper.
 Tab. xi.
 a a.*

The Nerves of the *Heart* and its Auricles, come
 from a *Plexus* of the *Par Vagum*, situated in the
Thorax a little above the *Heart*, and call'd by
Willis, *Plexus Cardiacus*.

Nerves.

Lymphatics.

It has some *Lymphæducts* which carry the *Lymph* from the *Heart* to the *Thoracic Duct*.

Motion.

The use of the *Heart* and its *Auricles* is to circulate the *Blood* through the whole *Body*, and their *Motion* is alternate, or opposite to each other, the *Auricles* being dilated to receive the re-fluent *Blood* whilst the *Heart* is contracted, and contracted whilst the *Heart* is dilated to drive the *Blood* into it.

By means of the right *Ventricle* the *Blood* is driven through the *Pulmonary Artery* into the *Lungs*, and by the *Pulmonary Vein* is return'd again to the left *Ventricle*, from whence thro' the *Arteria Aorta* is distributed all over the rest of the *Body*, and thence return'd again to the right *Ventricle* by the *Vena Cava*, so making an entire *Circulation* through the whole *Body*. This through the *Aorta* and *Cava* being a longer *Circuit* than that through the *Lungs*, a greater force is necessary to perform it, and therefore the *Parietes* of the left *Ventricle* are by Nature made much stronger than that of the *Right*.

Of the *Foramen Ovale* and *Canalis Arteriosus* in a *Fetus*, we have taken sufficient notice before.

T A B. XI.

THE forepart of the *Heart* and *Lungs*, with their large *Vessels*, clear'd of the *Pericardium*.

A, The *Heart* in its natural *Position* with its *Cone* inclining to the left side.

B, Its *Basis*.

C, Its *Cone*.

a a, The *Fat* about its *Basis*, with the *Coronary Arteries* and *Veins* running through it before they are distributed to the *Substance* of the *Heart*.

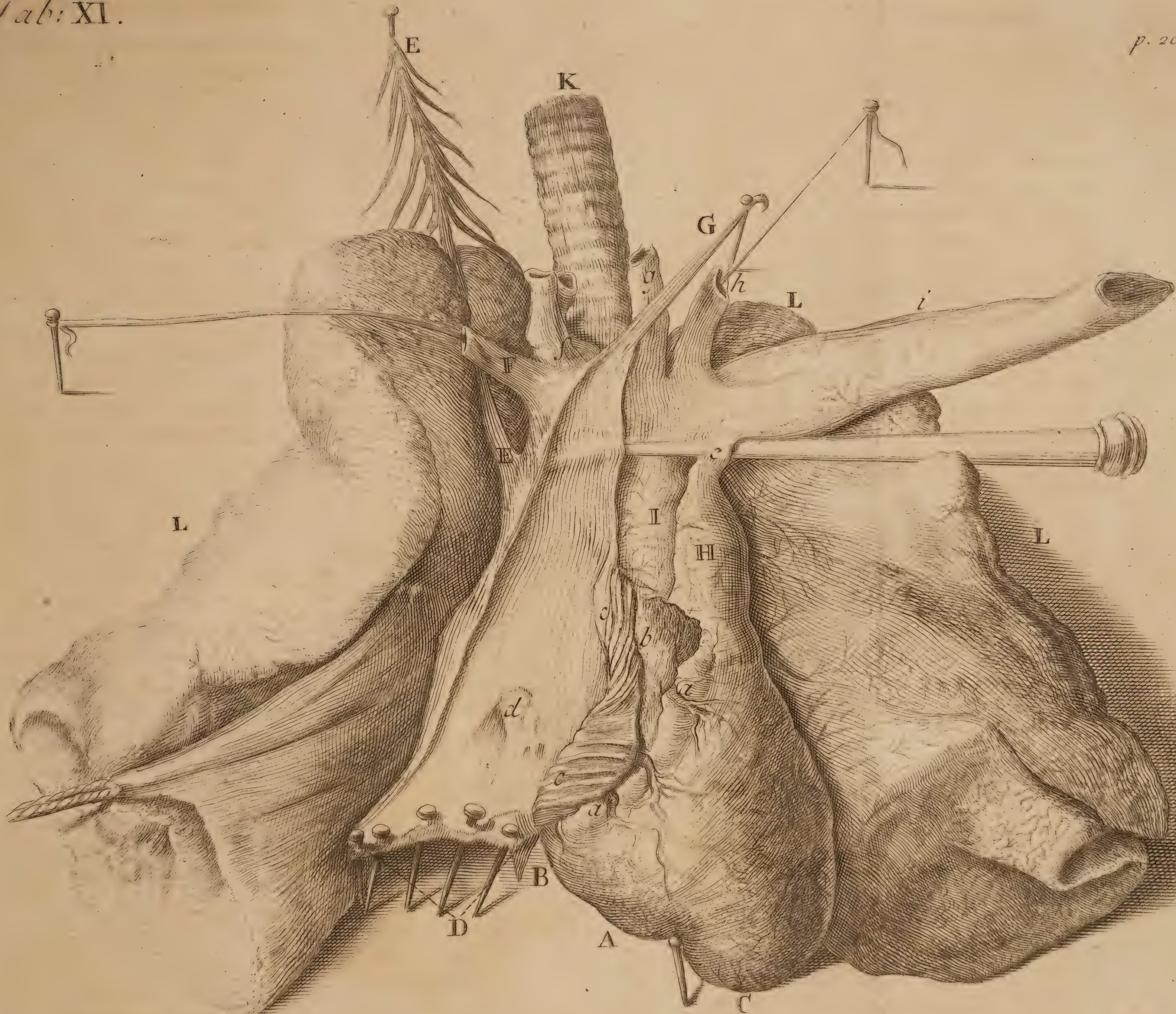
b, The *External Surface* of the right *Auricle*.

c c, The *Internal Surface* turn'd out to shew its *Carinous Fibres*.

D, The *Trunk* of the *Vena Cava* cut off immediately above the *Diaphragm*, slit open and expanded, in which may be seen,

d, The *Foramen Ovale*, here closed.

E E, The *Trunk* of the *Vena Azygos* emptying it self into



into the Superior or Descending Trunk of the *Cava*.

F, The *Right Subclavian* Trunk pinn'd out.

G, Part of the Left also pinn'd out.

H, The Trunk of that *Arteria Pulmonaris* as it arises out of the Right Ventricle of the Heart.

e, The *Canalis Arteriosus* converted into a Ligament between the *Pulmonary Artery* and Descending Trunk of the *Arteria Magna*.

I, The Trunk of the *Arteria Magna* arising out of the Left Ventricle of the Heart.

f, Its first long Trunk, which is soon divided into Two (as here express'd) of

which one makes the *Right Carotid*, the other the *Axillary* of the same side, both cut off in this Figure.

g, The Trunk of the *Left Carotid Artery*.

h, The *Left Axillary* Trunk also cut off.

i, The Descending Trunk of the *Arteria Magna*, freed from the back parts of the *Left Bronchia*, and from between the hinder parts of the *Lobes* of the Lungs, here drawn out and extended.

K, The Wind-pipe cut immediately below the *Annular Cartilage*.

L, The Right and Left *Lobes* of the Lungs; those of the Right side being drawn out to shew the Trunk of the *Vena Cava*.

C H A P. VI.

Of the ASPERA ARTERIA and LUNGS.

THE ASPERA ARTERIA or TRACHEA is a fistulous Tube compos'd of *Cartilages* and *Membranes*, descending from the *Fauces* into the Lungs, and distributed by infinite *Ramifications* through the Substance of them.

Aspera
Arteria.
Tab. xi.
K.

It runs along the fore-part of the *Oesophagus* as far as the fourth *Vertebra* of the *Thorax*, where it is divided into two principal Branches which are bestow'd on the *Lobes* of the Lungs on each side, and these again are innumerably ramify'd, sending a small Twig to every *Vesicle* of which the Substance of the Lungs is compos'd.

The upper part or Head of it is compos'd of *Larynx* five *Cartilages* of different Figures and Names.

Cartilago
Thyroi-
des.
App.
Tab. viii.
Fig. x.

The biggest of these is that which guards the Fore-part of it, and from the Form of a Shield, which fanciful Men resemble it to, has been call'd *Thyroides* and *Scutiformis*. It is of a Concave-Convex square Figure, the hollow part being inward and the Gibbous outward, having a little Prominence in the middle call'd *Pomum Adami*. It has four *Processus*, each corner one, of which the two upper are the longer, and tie it by means of a Nervous Ligament to the under part of the *Os Hyoides* on each side: The lower and shorter connect it to the second *Cartilage*, which is call'd

Cricoides.
Ibid.
Fig. xi.

Cricoides or *Annularis* from its Figure, which is like that of a *Turkish* Ring. The fore-part of this is very narrow coming under the former *Cartilage*, but behind it is broad, thick and strong, and is as it were the *Basis* of all the other.

Arytæ-
noides.
App.
Tab. viii.
Fig. xii.

The third and fourth are call'd *Arytænoides* or *Guttales*, from the Figure of an Ewer which these two *Cartilages* joining together somewhat resemble. At the Juncture of these two on the upper part of the *Larynx*, is a Chink bearing the Form of a little Tongue, and therefore call'd *Glottis* or *Lingula*. Through this Chink the Air descends into the Lungs, and the Pituïtous Matter which is ejected by Coughing in *Catarrhs* is let out.

Epiglottis.
Ib. b.

Over this Chink lies a fifth *Cartilage* call'd the *Epiglottis*, which is a thin soft *Cartilage*, and in Non-Adults almost Membranous, of a Figure near Triangular, Concave on the under side, and Convex on the upper. Its *Basis* is fastned to the *Thyroide* *Cartilage*, and its Point loose, that it may open and shut with the more ease. This *Cartilage* defends the Entrance of the *Trachea*, and hinders the Liquids which in drinking slip over it into the *Oesophagus* from falling into the *Trachea*; on the Gibbous Part or Back of the

Epiglottis,

Epiglottis, lies a little Caruncle, or rather Gland, Glands of the Epiglottis. cover'd with Fat. The Concave Part of it is beset with divers small Glands, which serve to moisten it, and perhaps the *Trachea* likewise.

Near the *Larynx* are situated four pretty large Glands. Glands; two of which, call'd the *Amygdalæ*, shall be accounted for among the Glands in the Mouth; the other two lie at the sides of the lower Cartilage of the *Larynx*, and are call'd *Glandulæ Thyroideæ*, which have no Excretory Glandulæ Thyroideæ. Duct (as yet discover'd) belonging to them, but are look'd on to be of the same kind with the *Thymus*, and discharge their *Lymphæ* into the Thoracick Duct.

These Cartilages of the *Larynx* are mov'd by Muscles seven pair of Muscles, two pair of which are Common call'd *Common*, the other five *Proper*. The *Pro-* and Proper. *per* Muscles are those which have both Origination and Insertion into the *Larynx*; the *Common*, which have only their Insertion there.

Verheyen, not satisfy'd with this Division, as External and Internal. just and instructive, divides them into External and Internal; of which the External are the same with the Common, being situated upon, and on the outside of the rest, which he calls *Internal*, and are the same with the *Proper* in the vulgar Division.

These Muscles have compounded *Greek* Names, which intimates both their Origination and Insertion.

The first common or external Pair is call'd Sterno- *Sternothyroides*, having its Head in the *Os Sternum* thyroides. or *Breast-Bone*, and its Tail in the *Thyroide Cartilage*, and serves to draw down that App. Tab. viii. Fig. xvi. *Cartilage*.

The second Pair is Antagonist to the former. App. Tab. viii. Hyothyroides. Its Head is on the *Os Hyoides*, and Tail on the *Thyroide Cartilage*, serving to lift up that Fig. xvi. *Cartilage*, and is call'd *Hyothyriodes*.

Cricothy-
roides.
ib. d.

The first internal Pair rises from the *Annular Cartilage*, and ascending obliquely on the hinder part, is inserted into the side of the *Thyroide*, and is call'd *Cricothyroides*. This Muscle dilates the *Scutiform Cartilage*.

Cricoary-
tænoides
Posticum.
Ibid. xiii.

The second internal Pair arises from the back-part of the *Annular Cartilage*, and terminates in the *Arytænoid Cartilage*, and by its Action it draws back that *Cartilage*, and opens the *Rima*, and is call'd *Cricoarytænoides Posticum*.

Arytæ-
noides.
Ib. cc.

The third Pair has its Head in one *Arytænoid Cartilage*, and its Tail in the other, and serves to bring them together and shut the *Rima*, and is call'd simply *Arytænoides*.

Cricoary-
tænoides
Laterale.
Ib. xiv.

The fourth Pair arises from the side of the *Annular Cartilage*, and is inserted on the lower part of the *Arytænoides* of the same side; it serves to open the *Rima*, and is call'd *Cricoarytænoides Laterale*.

Thyreoa-
rytænoi-
des.

The fifth and last Pair is the *Thyreoardytænoides*, situate under the *Cartilago Thyreoides*; from the fore and back part of which it proceeds with a very broad Head, and ends in the *Arytænoides*, which it constricts, and shuts the *Larynx*.

Trunk of
the Tra-
chea.

Tab. xi. K

The Trunk of the *Aspera Arteria*, which is continued from the *Larynx*, consists of *Cartilages*, making an imperfect Circle, clos'd on the hinder part by a Membrane, lest the Stiffness and Resistance of the *Cartilages* pressing upon the *Oesophagus* might hinder Deglutition. These *Cartilages* are from the *Annularies* to the Division in

Its Carti-
lages.

Muscular
Membrane.

number about twenty, join'd together on the back part by a strong fleshy Membrane, which upon the *Cartilages* themselves is more tendinous, and in that part not continuous, but interrupted by the Interposition of the *Cartilages* themselves. It consists of transverse Fibres approaching a circular Figure.

The inside of the *Trachea* is lin'd with a Mem- *Inner*
brane, which is continued down to its smallest *Tunic*.
Ramifications. This is thinner than the former,
and consists of longitudinal Fibres, intersecting
those of the other at right Angles. These Fibres
do not all of them reach the whole length of the
Air-Pipe, but some of them terminate short in the
intermediate *Cartilages*, others arise from them,
and are continued downwards. This *Tunic* is
thought to be acutely sensible, and to be the oc-
casion, that the least crumb of any *Solid*, or drop
of *Fluid*, slipping into the *Trachea*, raises a kind
of convulsive Cough.

Verheyen thinks that this *Tunic* is cloath'd with *Verhey-*
another true nervous Membrane, to which he *en's Opi-*
chooses to ascribe this acute Sense; but he gives *nion*.
neither Figure nor Description of it.

Between the two *Tunics* lie a multitude of small *Tunics*
Vessels, and very minute Glands, to each of *according*
which *Willis* allows a particular Membrane, cal- *to Willis*.
ling one the glandulous, the other the vasculous
Coat.

Besides these, it has another outward loose *Exterior*
Coat, which is divisible into several *Lamellæ*, and *Membrane*.
abounds with Blood-Vessels. By means of this
Coat it is connected to the *Oesophagus*, and other
adjacent parts.

Verheyen has discover'd another sort of Glands, *Verhey-*
found generally about the *Bronchia* or Divisions *en's Bron-*
of the *Aspera Arteria*, especially about the lar- *chial*
ger Branches of it, to which they adhere closely *Glands*.
in pretty good Number, though he has found
them sometimes at some distance from them, with
a large Branch of the pulmonary Artery between
them, and of these he has observ'd so many, that
he doubts whether there be any considerable Ra-
mifications of the *Bronchia* without them; and
he has, as he says, counted an hundred or more
in one Subject.

These

*Their
Magni-
tude.*

These Glands, he says, differ in Magnitude: Those that lie nearest to the first and great divisions, being the largest, exceeding sometimes in bulk a Hazel-Nut. And tho' he has sometimes observ'd those which adhere to the lower Branches to be bigger than those above, yet he suspects them to be in a preternatural Condition.

*Their Sub-
stance.*

Their Substance is naturally soft and succulent, cover'd with a common Membrane, and in Colour blackish.

Figure.

Their Figure is various and irregular, some being almost oval, others longer, and shap'd more like a Raisin; some triangular, &c. but the Surface of all is smooth enough to entitle them to the Name of *Conglobate Glands*.

Vessels.

They receive Arteries and Veins from the *Pulmonaries* for their common Function, and for their proper Nourishment from the *Bronchials*; their Nerves from the *Par Vagum*, especially the *Cardiac Plexus*.

He confesses not yet to have seen their Excretory Ducts, but imagines them to be very short, and to reach only from the Glands to the inward Surface of the *Bronchia*.

Use.

Their Use he supposes to be to separate that unctuous Humour, with which the inside of the *Bronchia* is lin'd, and thereby to defend it from the Injuries which a cold harsh dry Air might otherwise subject the Lungs to: And he thinks that the Hoarseness which arises from a Cold taken, may proceed from an Obstruction of these Glands, and that the Benefit which accrues from taking *Oil of Almonds*, or other slippery smooth Medicaments, may proceed from their supplying the Defect of their Juice, and lubricating artificially the inside of the *Bronchia*. But it's well known that the miliary Glands of the Wind-pipe and *Bronchia* supply that Humidity which moistens their insides, and these are only *Lymphatick Glands*,
that

that become tumid in morbid Cases, insomuch that they often press the Wind-pipe, or some of its Branches, before they enter the Lungs, and render the Patient *Asthmatick*, which often proves fatal. These Glands are scarce visible in a *Fœtus*.

The *Trachea* has Arteries from the *Carotids* Vessels of the Trachea. and from the *Bronchials*, and sends Veins to the external Jugular. These Vessels accompany it thro' its whole Distribution.

The Lungs, which are the immediate Organ The Lungs. of Respiration, consist of Vessels and membranous Tab. xi. Vesicles. They are connected above to the *Fauces* Connexion. by means of the *Trachea*, and below to the *Vertebræ* of the *Thorax*, and to the *Sternum* and *Diaphragm*, by means of the *Pleura*.

They are divided into two great *Lobes*, and Ib. I. those again into others lesser; the right sometimes into three or four, by means of some Fissures running from the fore to the back edge.

The great *Lobes*, when inflated, resemble each Lobes. of them a Horse's hoof in Figure, but together Tab. xi. they are liker an Ox's inverted. L L.

The Substance of the Lungs is membranous, Substance. consisting chiefly of innumerable Cells or Vesicles, which seem to be nothing but Expansions of the Membranes of the *Bronchia* to which they hang, like Grapes in Clusters; so that by blowing into one of the Branches of the *Bronchia*, these Cells or Vesicles which belong to it will be blown up, the rest, which do not, remaining still flaccid and unalter'd.

These Clusters of Vesicles or Cells are call'd Internal Lobules. the internal *Lobules*, by which Names they are distinguish'd from the lesser *Lobes* spoken of. These *Lobules* are separated from one another by Interstices which receive the Vessels, and are fill'd up with Membranes propagated from the *Lobules*, and lying some Parallel some Angular. These *Lobules* discover and display themselves ve-

ry exactly, if the larger Trunks of the *Bronchia* be laid open, and the lesser be blow'd into, by which means every *Lobule* belonging to that Branch will be inflated, and rise very distinctly, and shew its Extent.

*Mem-
brane.*

The whole Substance of the Lungs is cover'd with a common Membrane, which is divisible into two Coats; the outer thin, smooth, and nervous; the inner somewhat thicker and rougher, consisting mostly of the Extremities of Vessels and Vesicles, through the Impression of which it is pitted, and resembles in some measure a Honey-Comb.

*No Perfo-
rations.*

Some affirm that there are in this Coat abundance of Perforations or Pores, so dispos'd, that they readily imbibe any Humidity from the Cavity of the *Thorax*, but suffer nothing to escape into it. But this seems to be a Fancy grounded upon no justifiable Observation.

Vessels.

Its Vessels are the *Bronchia*, the pulmonary and bronchial Arteries and Veins, Nerves and Lymphaticks. Of these Vessels some are Proper, some Common, in respect to the Service they are of to the rest of the Body. The Common are the *Bronchia*, the pulmonary Artery and Vein, the Nerves and the Lymphaticks. The Proper are the bronchial Artery and Vein.

*Bronchia.
Ap. Tab.
viii, ix, x.*

The *Trachea*, just before it enters the Lungs, divides it self into two Branches, sending to each *Lobe* one; which are again divided into innumerable Ramifications, which are call'd *Bronchia*. The *Bronchia* and their Branches consist of Cartilages like the *Trachea*, only here the Cartilages are perfectly circular, without any membranous hinder part; of which, having left the *Oesophagus*, they have no need. These circular Cartilages are join'd together by the Membranes that invest them, and are capable of being shot out into length upon Inspiration, and of shrinking up
and

and running into one another in Expiration, when the Cavity of the *Thorax* is lessen'd. They send their little Ramifications to all the little Vesicles of the Lungs.

Along with these Air-Vessels run the Branches of the pulmonary Artery and Vein, sending their Ramifications exactly along with the other. The Artery bringing the Blood from the right Ventricle, and the Vein carrying it back to the left Ventricle of the Heart. Whether the Blood returns by the Vein impregnated with Air in the Lungs, is still a Question.

Pulmonary Artery and Vein.
Tab. xii.
xiii. xiv.

The Bronchial Artery arises from the hinder part of the *Aorta*, a little above the *Basis* of the Heart; whence turning off to the right, it embraces the *Trachea*, and after sending off a Branch or two to the *Oesophagus*, it pursues the Course of the *Bronchia*, accompanying all their Branches thro' their whole Progress. This Artery is sometimes single, but oftner there are two of them, and sometimes three, which rise at about a Finger's breadth, or less distance, from one another.

Bronchial Artery.
App.
Tab. x.

Concomitant to these Arteries is a Vein, whose Branches arise from the Ramifications of the Capillary Arteries. Whether the Blood returns by one or more Trunks, is not yet sufficiently apparent. These Vessels bring Blood for the Nutriment of the *Bronchia*, and Vesicles of the Lungs, and carry it back again.

Vein.

Through the Lungs are distributed a great number of Lymphaticks attending generally the Blood-Vessels, and being at length collected, empty themselves into the Thoracic Duct.

Lymphaticks.
App.
Tab. ix.

Dr. *Willis*, contrary to the vulgar Opinion, ascribes to the Lungs a great Number of Nerves, which come from the Trunk of the *Par Vagus*, which being distributed through the Substance of the Lungs, embrace the aerious and sanguiferous Vessels.

Nerves.

T A B. XII.

THE *Arteria Pulmonalis* fill'd with Wax, and freed from the Lungs and no more display'd than they are suppos'd to be in Expiration, from an Adult as big as the Life.

A, Its Trunk cut close to the *Basis* of the Heart, and ty'd up.

B B, Its Divisions to the

right and left *Lobes* of the Lungs.

C, The *Canalis Arteriosus* converted into a Ligament.

bbb, The Extremities of the pulmonary Arteries freed from the Vesicles of the Lungs, and their Conjunctions with the pulmonary Veins.

C H A P. VII.

Of the Motion of the HEART, and Use of RESPIRATION.

Circulation of the Blood, by whom discover'd.

THO' divers accurate Treatises of the Heart, and its Action, have been written by learned Men of several Nations, especially by two of our own Country, the Great Dr. HARVEY, to whose happy Sagacity this Nation owes the Glory of the Discovery of the CIRCULATION of the BLOOD; and the incomparable Dr. LOWER, to whom we are beholden for a complete Display of the *Mechanical Structure of the Heart*, and a most ingenious *Rationale* of its Action. Yet there remain several Doubts and Difficulties about it (in my Opinion) not sufficiently accounted for; towards the resolving some of which, I shall offer what my own Thoughts have suggested to me, and leave it to the Consideration of the Reader.

Systole of the Heart sufficiently accounted for by Dr. Lower.

The Learned Dr. LOWER (whose accurate Piece on this Argument will insure his Reputation so long as Physical Knowledge shall last in Esteem)



Esteem) has so well accounted for the SYSTOLE, or Contraction of the Heart from the Mechanical Structure of it, that he seems almost to have exhausted the Subject, and had he been as happy in discovering the true Cause of the DIASTOLE, he had left little room for the Industry and Sagacity of others about this *Viscus*.

But having judiciously and solidly explain'd the *Systole*, he contents himself to ascribe the DIASTOLE to a Motion of Restitution; which Account gives me no Satisfaction: Because the *Systole* being the proper, and (as himself confesses) the only Motion of the Heart, a State of Contraction seems to be the Natural State, and consequently without external Violence, it should have no *Diaстole* at all.

This will appear more plain, if we consider the Circumstances of it, and its Motion, as a Muscle, with respect to other Muscles. That Contraction is the proper Action and State of all Muscles, is evident from Experience of Fact, as well as Reason. For, if any Muscle be freed from the power of its Antagonist, it is immediately contracted, and is not by any Action of the Will or Spirits, to be reduc'd to a state of Dilatation. Thus, if the *Musculi Flexores* of any Joint be divided, the *Extensores* of that Joint being by that means freed from the contrary Action of their Antagonists, that Joint is immediately extended without any consent of the Will, and in that state it remains; and so *Vice versâ* if the *Extensores* be divided. From whence it is plain, that the Muscles have no Restitutive Motion, but what they derive from the Action of their Antagonists by which they are balanc'd. Thus the *Sphincters* of the *Gula*, *Anus* and *Vesica*, having no proper Antagonists, are always in a state of Contraction, and suffer nothing to pass them, but what is forced through them by the contra-

Diaстole
not so by
him or any
other
Writer.

Contraction the
True Natural State
of all
Muscles.

ry Action of some stronger Muscles, which, tho' not properly to be call'd Antagonists, yet on all necessary Occasions perform the Office of such.

*The Heart
a Muscle.*

That the HEART is a Muscle, furnish'd and instructed for Motion like other Muscles, is (in my Opinion at least) demonstrated beyond contradiction by Dr. *Lower* and others. And, as it is a Solitary Muscle without any proper Antagonist, and not directly under the power of the Will, nor exercising Voluntary Motion, it approaches nearest to the *Sphincter* kind, which only has these Conditions in common with it. But in constant and regular Alternations of Contraction and Dilatation, it differs exceedingly from all the Muscles of the Body.

*Reciprocal
Æstus
of the
Heart.*

This Reciprocal *Æstus* of the *Heart* has given the Learned abundance of trouble; who finding nothing peculiar in the Structure, which should necessarily occasion it, nor any Antagonist, whose re-action should produce it, have been extremely perplexed to find out the cause of it.

But passing over the various Opinions of Authors, to avoid being tedious, I shall take notice here only of the very Learned Dr. *Lower's*, in whose account of the *Systole*, however Solid and Ingenious, I observe something deficient, and whose *Hypothesis* of the *Diastrale* I think to be precarious and false.

This excellent Author, having by sound Arguments, drawn from the Structure and Mechanism of the Heart, establish'd the certainty of its Muscular Motion, rests satisfied, without taking notice of any Assistance that the Heart receives from any other Part, except from the Brain, by the means of the eighth Pair of Nerves.

*Borellus's
Computa-
tion of the
Force of
the Ma-
chine of
the Heart.*

The Accurate *Borellus* in his *Oeconomia Animalis*, computes the Motive Power of the Machine of the Heart to be equal to, or to surmount that of a Weight of 3000 l. The Obstacles to
the

the Motion of the Blood thro' the Arteries he esteems equivalent to 180,000 *l.* which is sixty times as much as he rates the Force of the Heart at. Then deducting 45,000 *l.* for the Adventitious Help of the Muscular Elastick Coat of the Arteries, he leaves the Heart with a Force of 3,000 *l.* to overcome a resistance of 135,000 *l.* that is, with one to remove forty five.

Part 2d.
Prop. 67.
Prop. 73.

This stupendous Effect he contents himself to ascribe to the Energy of *Percussion*. But, had he proceeded in his Calculation to the Veins, which he allows to contain constantly a quantity of Blood, quadruple to the Contents of the Arteries, and to which this Energy of *Percussion* does either not reach at all, or but very languidly, he might probably have seen a necessity for some other Expedient to remove so insuperable a Difficulty.

He ascribes it to Percussion.

But not to insist rigorously on the Exactness of this Calculation (tho' the great Abilities of the Author in this way, and his Ingenuity and Modesty, are a sufficient Warrant for the Accuracy of his Computations, and the Fidelity of his Accounts) we may allow a much greater Deduction than would be justifiable, without lessening the Difficulty. But this Account I have taken notice of purely for the sake of the Calculation, which may be of use in the Sequel, the Account it self being in other respects more defective than Dr. *Lower's*, to which we will return.

The Doctor, notwithstanding his great Sagacity, appears (to me) to have over-look'd something of great Moment and Importance in the Explication of the Action of the Heart. For, tho' it should be granted, that the Muscular Fibres of the Heart acted by the Nerves, are the immediate Instruments of its Constriction or *Systole*, yet it must not be denied, that the Inter-costal Muscles and *Diaphragm* are of great Service

Defect in Dr. Lower's Systole.

*Intercostal
Muscles
and Dia-
phragm
promote
the Sy-
stole
more than
one way.*

to aid and facilitate this Contraction, by opening a Passage for the Blood through the Lungs, which denied would be an invincible Obstacle.

Neither do they promote it that way only. The manner how they farther assist the Heart in its Contraction, will appear manifestly, if we consider the different Posture, Situation and Capacity of the Blood-Vessels of the Lungs in the several times of Elevation and Depression of the *Costæ*.

*Rise and
Progress
of the
Pulmona-
ry Artery.*

The Pulmonary Artery rises from the right Ventricle of the Heart, and runs in one Trunk till it comes to the *Aspera Arteria*, where it is divided, and sends a Branch along with each Division of the *Aspera Arteria*, according to all the minutest Subdivisions, of which it is likewise subdivided, accompanying all the *Bronchi* in their whole Progress through the Lungs.

*The same
of the
Vein.*

The Pulmonary Vein, which empties it self into the Left Ventricle of the Heart, spreads it self on the *Aspera Arteria* and *Bronchi*, in the same manner that the Artery does.

*Conse-
quence of
the Struc-
ture.*

The necessary Consequence of this Disposition is, that this Artery and Vein being co-extended with, and fasten'd to the *Bronchi*, must needs suffer such Alteration of Superficial Dimensions, as the *Bronchi* do in the Elevation and Depression of the *Costæ*.

*Bronchi
shrink in
Expirati-
on, and
so do the
Blood-
Vessels
that ac-
company
them.*

While the Ribs are in a state of Depression (whether before Commerce with the external Air or after) the Annular Cartilages of the *Bronchi* shrink one into another, and by that means their Dimensions are exceedingly contracted. In conformity to this condition of the *Bronchi*, the Pulmonary Artery and Vein must likewise, either by means of their Muscular Coats contract themselves to the same Dimensions, or lye in Folds or Corrugations, which is less probable.

On the other hand, when the Ribs are elevated, and the *Diaphragm* bears downwards, the Air rushing into the Lungs, shoots out the Cartilaginous Rings, and divaricates the Branches of the *Trachea*, and by them extends and divaricates the several Divisions of the Pulmonary Artery and Vein, and thereby lengthens and enlarges their Cavities. *They shoot out, and divaricate in Inspiration.*

The Enlargement of their Cavities is very considerable, not only upon the Score of the Addition, which they receive in length thereby, but also upon the Account of their Divarication. For whereas, when the Ribs are depress'd, and the Lungs subside, the Blood-Vessels are not only contracted, (as I have already observ'd) but their Branches which are exceeding numerous, approach one another, and lie in juxtaposition, by which their Cavities are very much compress'd and straitned : When the Ribs are elevated, and the Lungs turgid with Air, not only the Fibres, by which their Coats in the opposite State were contracted, are extended : but those innumerable Vessels, which lying before in Lines almost parallel one upon another, compress'd one another, making an acute Angle at their Junctions, are divaricated and separated from each other, and make an obtuse, whereby their Channels are widened. *Capacity of the Blood-Vessels considerably enlarged thereby.*

Thus a Passage is open'd to the Blood, from the Right Ventricle of the Heart to the Left, through the Lungs, to which it could not otherwise pass ; and the Opposition which the Blood contain'd in that Ventricle, must otherwise necessarily have made to its Constriction, is taken off, and the *Systole* thereby facilitated. *Passage thereby open'd for the Blood.*

Nor is that all. For the *Diaſtole* being caus'd (as I shall in the Sequel shew) by the Force of the Blood rushing into the Ventricles, this Ampliation and Extension of the Pulmonary Artery is a fort *Diaſtole whereon depending.*

*Action of
the Pul-
monary
Artery
compar'd
to that of
a Syringe.*

fort of Check or Counterpoise to it, and prevents an endeavour towards two contrary Actions at once, which must necessarily frustrate both. For the Heart being a Springy Compressible Body, whose proper Action, which is Contraction, depends on the Influx of certain Fluids in its Fibres or Substance; and containing besides a Fluid in its Ventricles, or great Cavities, in one of which is the Mouth of this Artery, the Action of this Vessel must in great measure resemble that of a Syringe, whose Extremity is immers'd in Water, the Enlargement or Expansion of the Channels of the Artery, answering the drawing of the *Embolum*, as the Constrictive Motion of the Muscle of the Heart does the Pressure of the *Atmosphere* upon the Surface of the Water; the one making way for the Fluid, and the other forcing it to follow, where the Resistance is least. In this Sense we may allow a sort of Attraction to the Pulmonary Artery, depending wholly upon the Action of the Intercostal Muscles and *Diaphragm*, which we must therefore confess to be very serviceable and instrumental in promoting the *Systole* of the Heart.

But if the Learned Author be deficient in his Account of the *Systole*; that is, if he has not observ'd all the Mechanism and Contrivance of Nature for the Contraction of the Heart; much less sufficiently has he accounted for the *Diastole*, or Dilatation of it; which he ascribes to a Motion of Restitution of the over-strain'd Fibres, which yet he confesses are made for Constriction only. 'Tis true, he immediately after joins the Influx of the Blood as a concurrent Cause; but from the slight Notice that he takes of it, 'tis plain, that he did not so much as dream of any great Share it had in that Action. His Words are these.

Quin & (ut obiter hoc moneam) cum omnis motus contractione perficiatur, & Cordis Fibræ ad constrictionem solum factæ sint, apparet quoque Cordis motum totum in Systole positum esse; cumq; Fibræ ultra tonum suum in omni constrictione ejus tendantur, idcirco ubi nixus iste absolvitur, motu quasi restitutionis Cor iterum relaxatur, & sanguine à Venis influente rursus distenditur; à nullo enim cordis motu, nisi tensionem suam remittente, & ab irruente sanguinæ Dia stole ejus libratis vicibus succedit.

De Corde
pag. 75.

Lower's
Hypothe-
sis of the
Dia stole.

I have transcrib'd the entire Paragraph, because it contains his whole *Hypothesis* of the *Dia stole*, and all the Notice that he takes of it thro' his whole Work. But how slender soever this may prove, it is the most substantial that I have any where met with, except a late one of Mr. Cowper, which is properly an Improvement of this, and shall be consider'd in the Sequel.

But, if Contraction be the sole Action of these Fibres (as this Great Man confesses it to be) and as indeed it is of all Muscular Fibres; I wonder how so judicious a Writer came to slip into such an Absurdity, as to call their Distention (vulgarly but improperly call'd Relaxation) a Motion of Restitution. For from the Nature of those Fibres, and their Disposition, the Structure of the Heart appears manifestly to be *Tonical*, and its Dilatation a State of Violence; and consequently the Constriction is the true Motion of Restitution, and the State to which it will spontaneously return, when the Force is taken off, which is the Work of the Intercostal Muscles and *Dia phragm*.

Dia stole a
State of
Violence.

Thus we are left still to seek for the true Cause of the *Dia stole*, which seems to me to be the main and most difficult *Phænomenon*, relating to the Heart and the Circulation of the Blood. But in Mr. Cowper's ingenious Introduction to his

Anatomy

Anatomy of human Bodies, I find the Share which Dr. *Lower* hints the Blood to have in that Action, farther prosecuted, and improv'd into the main Instrument of the Dilatation of the Heart, wherein I agree entirely with him. But as to the manner, and reasons of its being so very Instrumental, I can't be so perfectly of his Mind.

Mr. Cow-
per's Hy-
pothesis.

The Heart (says this accurate Anatomist) of an *Animal* bears a great Analogy to the Pendulums of those Artificial Automata, Clocks and Watches, whilst its Motion is perform'd like that of other Muscles, the Blood doing the Office of a *Pondus*.

Mr. Cow-
per's Pon-
dus confi-
der'd.

By the Blood's doing the Office of a *Pondus*, I suppose he means, that the Blood contributes in the same manner to the Motion of the Heart, as the Weights do to that of the *Pendulum* of a Clock. If so, the Blood, according to him, must be the Instrument of Constriction; and Dilatation must be the Natural State, or Spontaneous Motion, to which it wou'd, when under no Violence, return; the contrary of which, I presume, will appear ere I have done.

But if he means, that the Blood in its reflux, by gravitating on the Auricles and Ventricles, dilates and expands 'em, acting therein as a Counterpoise to its Contraction as a Muscle, I could wish his Design had not bound him up to so narrow a Compass, and that he had given us an Explication at large of so abstruse and so important a *Phænomenon*. Because the Specifick Gravity of the Blood seems to me a Cause by no means alone, adequate to the Effect, which it is here suppos'd to produce.

Weight of
the De-
scending
Blood.

For, if the Blood acts only as a Weight by mere Gravitation, then that part of it only which descends from the Part above the Heart can be employ'd in that Action. This at the largest Computation can't amount to five Pound Weight, and must, according to the Computation of *Bo-*

rellus,

rellus, force a Machine, that is able to overcome a resistance of 135,000 *l*. I leave every Man to deduct what he shall upon examination find reasonably to be deducted, and yet shall rest secure, that it is not to be affected in the least with so small a Weight.

But neither does the Refluent Blood gravitate in any such proportion, as I have here assign'd. For to make a true Estimate of its Gravitation, we must consider the Circumstances of the Liquor suppos'd to gravitate, in which it very much resembles Water inclos'd in a recurve Tube, of which, if the Length of the two Legs be equal, it may be suspended in the Air full of Water, with the Extremities downwards, without losing a drop, altho' the *Diameter* of those Legs should be very unequal. The Case of the Arteries and Veins is pretty near a Parallel to a Tube, so fill'd and inverted. For, if the Arteries and Veins be continued Tubes, (as by the Microscope they seem to appear) then supposing their Contents to have no other determination of Motion, than their Weight would give them, the contain'd Fluids must be counterpoises to each other. For the Veins and Arteries being join'd at the smaller Extremities, and the larger of both terminating in the same Parallel Line, it is impossible, according to the Laws of *Hydrostaticks*, that the Contents of either should over-balance t'other. How far then must it fall short of forcing the natural Power and Resistance of so strong a Muscle as the Heart, by mere Gravitation?

The Blood indeed has a *Progressive* Motion thro' its Vessels, wherein it differs from Water in a recurve Tube, in the Experiment above stated. But, if the natural Gravitation of the Blood contributes nothing to the Dilatation of the Heart, this Progressive Motion will not be found much more sufficient. For, as this Motion is

Mere Gravitation of the Refluent Blood not sufficient.

Nor the Progressive or Circulatory Motion simply consider'd.

de-

deriv'd entirely from the Heart's Constriction (as all Accounts hitherto derive it) could the Blood be suppos'd to re-act upon the Heart, with all the Force first impress'd upon it by the Heart, it would be insufficient, unless we will suppose the Force communicated to be superior to the Power communicant, which is absurd.

But when the just and necessary Deductions for the Impediments, which the Blood meets with in its Progress thro' the Vessels, shall be made, the remaining Force will be found so exceeding weak, that to propel the Blood thro' the Veins may be a Task alone too great for so small a Power, without charging it with the additional difficulty of forcing the Muscle of the Heart.

We find it so far from equal to such a Task, that, were it not for the Valves, which are placed in the Trunks of the Veins, the Weight alone would probably be too great for the Impulse, and the Blood never arrive at the Heart.

Disparity
between
the Force
of the
Heart and
the Resist-
ance it
meets with
according
to the Cal-
culation of
Alphon-
sus Borel-
lus.

Alphonfus Borellus, after a great deal of solemn Pains taken to shew his Care and Exactness, and to possess his Reader of the Truth of his Calculations, casts up the Force of the Heart, and the Muscular Coat of the Arteries, to be together equal to a Weight of 3,750 *l.* and allots 'em a Resistance equal to 180,000 *l.* to overcome which is 45 to 1. To make up for a Disproportion, by his own Confession, incredible to those who have not consider'd the Matter as he had done, he flings into the Scale the additional *Force of Percussion*, which he leaves *indefinite*, and thinks sufficient to *force any quiescent finite Resistance whatsoever*.

But as this Account and Hypothesis are part of a posthumous Work, (if a liberty of Conjecture may be allow'd in so uncertain a Matter,) I should suspect that these Papers were left unfinished by

Borellus;

Borellus, or at least, that in many Places the last Hand was never put to 'em. For, neither in this Place, nor any other of this Work, does he account for any more than the *Systole* of the Heart, and the Resistance which is made to the progressive Motion of the Blood in the Arteries only. This alone he found to exceed the Power of the Heart so prodigiously, that he seems to shuffle it off his Hands with a general and precarious Solution, as a difficulty that he was desirous to be rid of. For, having ascrib'd this stupendous (as he himself calls it) effect to the Energy of Percussion, he takes no care to satisfy his Reader any farther about it, or to refer him, or give him the Expectation of Satisfaction any where else; altho' he has an express Treatise on the *Force of Percussion*, which was written preparatory to this, and to which he frequently refers in other Places of this Work. But what confirms my Suspicion, that this Part was intended for a farther Revise by the Author, is, that he has left the Progress of the Blood thro' the Veins, and the *Diastole* of the Heart, absolutely untouched, tho' they are Difficulties of a much greater Magnitude, than this which he has attempted to account so slightly for. For in these he is excluded the Benefit of Percussion, and has yet a greater Resistance to overcome without it. Omissions of this kind are so unusual with this Author, where-ever he knows himself to go upon sure grounds, that it is to me an Argument that he doubted the Sufficiency of his Percussion, and reserved these important *Phænomena* for farther Consideration, without plunging himself into such an Absurdity as to ascribe to Percussion any such Energy, as to be able (so broken as it returns to the Heart) by its re-action to force that Power, from whence only it was deriv'd.

Diastole
untouch'd
by Borellus.

Dr. *Lower* and Mr. *Cowper* deliver their Opinions of the Cause of the Dilatation of the Heart so very short, and without any Arguments to support 'em, that by exposing them naked, they seem rather to discourse of it transiently, as Men obliged by the Nature of their Subjects to say something of it, than solicitous to give any full or satisfactory Account, and therefore I shall proceed no farther upon 'em here.

But tho' the *Hypothesis* of *Borellus* may in this Case be found precarious or insufficient, (a Misfortune that has befallen him in divers other Particulars) his Theory holds good still. At least it ought to be allow'd in justice to his great Abilities and Exactness, till somebody convicts him of some material Error in his Calculations, which has not as yet been done by any body, that I know of.

Supposing then the Force of the Heart, and of the Muscular Coat of the Arteries, as likewise of the Resistance, which they must overcome, to be computed with any degree of Accuracy ; there remains yet such a prodigious Disproportion to be accounted for, as requires some more powerful Agent, than any yet assign'd, to make up the Deficiency.

What Assistance the Heart receives from the Action of the *Thorax* towards its facilitating its Contraction, without which Assistance there could have been no *Systole*, has been already shewn. But neither the *Intercostal* Muscles or *Diaphragm*, which are so instrumental in that part of its Action, can contribute any thing to the *Diaστοle* ; because they serve only to enlarge the Cavity of the *Thorax*, and thereby to open a Passage to the Blood from the Heart, and promote is Constriction.

Whatever therefore the Force is that dilates the Heart, and is the Cause of the *Diaστοle*, it must

must be equal to that of the Heart, the *Intercostal* Muscles, and *Diaphragm* ; to all which it acts as an Antagonist. I take no notice of the *Serratus Major Anticus*, and other Muscles, which have an obscure share in the Elevation of the *Costæ*, because as much may reasonably be deducted upon the account of the *Obliquus externus Abdominis*, and other Muscles ; which, having their insertions in some of the lower Ribs, are as instrumental towards the Depression of 'em, and so balance the account. But the chief use of these is in violent Respiration. In ordinary Respiration their share is small.

Such a real Power (which may in the least be suspected of any share in this Action) is hard, perhaps impossible to be found in the *Machine* of an Animal Body ; and yet without some such Antagonist, it is as impossible the Circulation of the Blood should be maintain'd. All the Engines yet discover'd within the Body conspire towards the Constriction of the Heart, which is the State of Quiescence, to which it naturally tends. Yet we find it alternately in a State of Violence, that is of Dilatation ; and this upon necessity, because upon this Alternation depends all Animal Life.

No sufficient Power within the Body.

Some sufficient external Cause must therefore be found, to produce this great *Phænomenon*, which Cause must be either in the Air, or *Atmosphere*, because we have no constant and immediate Commerce with any other *Media*.

Some great Physicians observing this, and that depriv'd by whatsoever Means of Communication with the external Air, we became instantly extinct ; have imagin'd, that in the Act of Inspiration, certain purer Parts of the Air mix'd with the Blood in the Lungs, and were convey'd with it to the Heart, where they nourish'd a sort of Vital Flame, which was the Cause of this reciprocal *Æstus* of the Heart. Others not quite so

The counterpoise external.

gross, rejecting an actual Flame, have fancied that these fine Parts of Air mixing with the Blood in the Ventricles of the Heart, produc'd an Effervescence which dilated it. But these Fancies have been long since exploded and condemn'd upon ample Conviction, and 'tis a Point yet undetermin'd, whether any Air does mix with the Blood at all in the Lungs, or not.

But supposing that some Air may insinuate it self into the *Pulmonary Vein*, it can no other way dilate the Heart than by an Effervescence in the left Ventricle, which would not dilate the right. But this Opinion is contradicted by *Autopsy*, and too laboriously confuted by others, to be brought upon the Stage again here.

There remains therefore only the gross Body of the *Atmosphere* to be consider'd, which is undoubtedly the true Antagonist to all those Muscles, which serve for ordinary Inspiration, and the Constriction of the Heart. This will appear more evidently, if we consider not only the Power, but the Necessity of its Action upon Animal Bodies, as well as the want of other sufficient Agents.

Heart and Muscles of the Thorax and Diaphragm have no Antagonists in the Body.

The Heart is a solitary Muscle of very great Strength, and the *Intercostal Muscles* and *Diaphragm*, which likewise have no Antagonists, are a vast additional Force, which must be balanc'd by the contrary Action of some equivalent Power or other. For, tho' the Action of the *Intercostal Muscles* be voluntary, that does not exempt 'em from the Condition of all other Muscles serving for voluntary Motion, which would be in a State of perpetual Contraction, notwithstanding any Influence of the Will, were it not for the libration of Antagonist Muscles. This libration between other Muscles is answer'd by the Weight of the incumbent *Atmosphere*, which presses upon the *Thorax* and other Parts of the Body. And,

as in all other voluntary Motions the influence of the Will only gives a Prevalence to one, of two powers before equilibrated, so here it serves to enable those Muscles to lift up a Weight too ponderous for their Strength not so assisted; and therefore as soon as that assistance is withdrawn, the *Costæ* are again depressed by the mere Gravitation of the *Atmosphere*, which would otherwise remain elevated thro' the natural tendency of those Muscles to Contraction.

This is evidently prov'd from the *Torricellian* Experiments, and those made upon Animals in Mr. *Boyle's* Engine; where, as soon as the Air is withdrawn, and the pressure thereby taken off, the Intercoastal Muscles and *Diaphragm* are contracted, and the Ribs elevated in an instant, and can't by any Power of the Will be made to subside, till the Air is again let in to bear 'em forcibly down.

It was scarce worth while to take notice here of a Mistake of the learned Dr. *Willis*, were it not for the great Authority of the Man, which is sufficient to keep that Error in Countenance, even to this very Day. The Dr. having observ'd that the Fibres of the External and Internal *Intercoastal* Muscles ran in a contrary Order, as it were decussating each other, takes occasion from thence to fancy, that there was an opposition in their Office, and that as the External serv'd to raise up the Ribs, the Internal drew 'em down again; forgetting at that time, that when a contractile Body is fasten'd at the several Ends to Points unequally moveable, let the Contraction happen in what part or manner soever, the more moveable Point must be drawn towards the less moveable: By which Rule, whether External or Internal *Intercoastals* be contracted, the lower Ribs will be forc'd to approach the upper, that is, be rais'd up.

*Error of
Dr. Willis.
De Respi-
rationis
Organis
& usu.*

Power
Antago-
nist to the
Muscles of
the Heart
and Tho-
rax.

As in the Elevation of the *Costæ*, the Blood, by the passage that is open'd for it, is in a manner sollicit'd into the Lungs, so in the Depressi- on of 'em, by the subsidence of the Lungs and the Contraction of the Blood-Vessels, both which are consequent thereof, the Blood is forcibly driven, as it were with an *Embolum*, thro' the Pul- monary Vein into the left Ventricle of the Heart. And this, together with the general Compression of the Body by the Weight of the *Atmosphere*, which surrounds and presses upon the whole Sur- face of it, is that Power which causes the Blood to mount in the Veins, after the force impress'd upon it by the Heart is broken and spent, and which is sufficient to force the Heart from its natural State to Dilatation.

Animal
Bodies
compressi-
ble Ma-
chines.

He that is able to compute the Weight of a Column of Air, equal to the Surface of the whole Body, will readily grant it a Power sufficient for the Effects, which are here ascrib'd to it. And, when he considers, that the Bodies of Animals are compressible Machines, he will find that it must of necessity affect them in the manner here laid down. But though our Bodies be entirely compos'd of *Tubuli*, or Vessels fill'd with Fluids, yet this Pressure, how great soever, being equal, could have no effect upon 'em, if the superficial Dimensions were not easily variable; because be- ing compress'd on all parts with the same degree of Force, the contain'd Fluids could not any where begin to recede, and make way for the rest to follow, but would remain as fixt and immo- vable as if they were actually Solid. But by the Dilatation of the *Thorax*, room is made for their Fluids to move, and by the Coarctation of it fresh motion is impress'd, which is the main Spring whereby the Circulation is set and kept going.

Recipro-
cal Dila-
tation and
Contracti-
on necessa-
ry to Ani-
mal Life.

This reciprocal Dilatation and Contraction of the superficial Dimensions of the Body seems so

necef-

necessary to Animal Life, that there is not any Animal so imperfect as to want it, at least none to the inward Structure of which our Anatomical Discoveries have yet reach'd. For, though most kinds of Fish, and Insects, want both moveable Ribs and Lungs, and consequently have no dilatable *Thorax*, yet that want is made up to 'em by an *Analogous* Mechanism, answering sufficiently the necessities of their Life.

Those Fishes, which have no Lungs, have *Respiration of Fishes.* *Gills*, which do the *Office* of Lungs, receiving and expelling alternately the Water, whereby the Blood-Vessels suffer the same Alteration of Dimensions, that they do in the Lungs of more perfect Animals.

The Lungs or Air Vessels of Insects are yet ex- *Of Insects.* ceedingly more different in Structure, Distribution and Situation from those of perfect Animals, than those of Fishes are, and yet in their Use and Action agree perfectly with both; that is, removing and expelling the Air, and varying the Dimensions and Capacities of the Blood-Vessels. These having no *Thorax*, or separate Cavity for the Heart and Air-Vessels, have the latter distributed through the whole Trunk of their Bodies, by which they communicate with the External Air through several *Spiracula* or Vent Holes, to which are fasten'd so many little *Tracheæ*, or Wind-pipes, which thence send their Branches to all the Muscles, and *Viscera*; and seem to accompany the Blood-Vessels all over the Body, as they do in the Lungs only of perfect Animals. By this Disposition in every Inspiration, the whole Body of these little Animals is inflated, and in every Expiration compress'd, and consequently the Blood-Vessels must suffer a vicissitude of Extension and Contraction, and a greater motion must thereby be impress'd upon the Fluids contained in 'em, than the Heart, which does not in these

Creatures appear to be Muscular, seems capable of giving.

The only Animal that is exempted from this necessary condition of Breathing, or receiving and expelling alternately some fluid into and out of the Body, is a *Fœtus*. But this, while included in the Womb, has little more than a vegetative Life, and ought scarce to be reckon'd among the number of Animals. For, were it not for that small share of Muscular Motion, which it exercises in the Womb, it might without absurdity be accounted for as a Graft upon, or Branch of the Mother.

Circulation in the Fœtus, maintained by impulse from the Mother.

Boyle of the Elasticity of Air. Pechlinus de Aeris & alimentis defectu.

Objections consider'd.

Concerning the immediate matter, and means of Life, and Nutrition, Authors are not agreed; nor is it the business of this place to reconcile, or decide their differences, but to account for the motion of the Blood through the Vessels only. In order to this, it will be necessary to observe, that the Pulsation of the Heart in a *Fœtus* is so very weak and obscure, and the Motion of the Blood so extream flow and languid, as to be scarce, if at all, perceivable, as has been experienced in the Dissection of Puppies before Respiration had. To produce such a feeble Palpitation, and creeping Motion, no greater force seems to be requir'd than may be deriv'd from the Communication between the Vessels of the Mother and *Fœtus* in the *Placenta*. I am not ignorant, that divers very Learned Anatomists (whom the Crowd have implicitly follow'd) have absolutely rejected all Communication between these Vessels. But, with submission to great Authorities, I think they have acted arbitrarily, and without sufficient Warrant from Reason or Experiment. For neither are the Arguments which they bring against it conclusive, nor the Office which they assign to the Umbilical Vessels in lieu of it, proper, or natural to those Vessels, or the reality of the

the Fact made out by any substantial Reasons. Those that reject this Communication usually do it in favour of one or both of these Opinions, that the Arteries of the *Uterus* do deposite a Nutritive Juice, or a Juice impregnate with Air in the *Placenta*, which is suck'd in by the Umbilical Vein, and convey'd to the *Fætus*, for the necessary Uses of Nutrition and Life. Now those that patronize either of these Opinions lead Nature an unnecessary dance. For if the Maternal Blood does really contain any such Nutritions, or any such necessary Aerial Particles, why should they be separated and extravasated, to be with difficulty received into the Umbilical Vein, and again mixt with the Blood; when they might more easily have been imparted by the plain simple way of Transfusion from the Arteries of the Mother to the Veins of the *Fætus*? And, that this is the course which Nature takes in this case, I am persuaded from the easiness and simplicity of the Method, which readily performs what might be perhaps in vain expected from the other, and would over and above find them, what they seem to grope so blindly about for, a first Mover of the Blood in a *Fætus*.

Those that contend for the conveyance of a Nutritious Juice, through the Umbilical Vein from the *Placenta*, are forc'd upon two difficulties next to Absurdities. For first, they are oblig'd to make this Vein, which, as all other Veins, seems dedicated to the re-conveyance of Blood only, the proper and immediate Channel, through which a very indifferent Liquor is to be carried; and next to give a Power of Attraction or Suction to it; because the Nutritious Juice, which it is thus destin'd to carry, is both Viscous and Stagnant, and has neither force to drive, nor subtilty to penetrate, or insinuate it self into the Capillary Veins; and therefore must be drawn or

*Objections
against
Nutrition
by the
Umbili-
cal Vein.*

suck'd as Milk is from the Breast, to which the *Placenta* and its Nutritious Juice are by the favourers of 'em expressly compar'd. But if this were the sole use of the *Placenta*, and Umbilical Vessels, why were the Umbilical Arteries sent along with the Vein? Their Business is not to bring any thing back to the *Fœtus*, nor can they contribute any thing to the benefit of the Mother; for the Uterine Arteries bring all to the *Placenta*, the Umbilical Vein carries it to the *Fœtus*, and the Uterine Veins convey back again the Surcharge of the Mother's Blood; the Umbilical Arteries only have nothing to do, and are superfluous and impertinent, which is contrary to the constant Practice of Nature. Yet if *Autopsy* did in the least countenance this *Hypothesis*, some defence might still be made; but we find in the Umbilical Vein of a *Fœtus* nothing but Florid Blood, such as in all probability it receiv'd immediately from the Arteries of the Mother without any Mixture. And therefore I can't help concluding, that this opinion engages its favourers in some Absurdity, without Necessity and without Proof.

Fœtus
not supplied with
Air from
the Placenta.

They that from the *Placenta* supply the Body of the *Fœtus* with Air, are as much distress'd as the other; for they are forc'd to beg the Question twice, which, even when granted, will not answer their ends. First, they suppose, that an intimate mixture or confusion of Air with the Blood, is necessary for the support of Animal Life; a *Postulation*, which perhaps the former part of this Discourse may have render'd unnecessary; and next that the *Fœtus* is supplied with Air from, and its Blood mixt with it in the *Placenta*.

But here again they fetch a Compass without necessity or proof. For if a mixture of Air were necessary to a *Fœtus*, why should it be separated from the Mother's Blood, and not rather both communicated together, since it is so much more
easy

easy and commodious? But neither does the *Placenta* seem to be instructed and provided for the Separation of Air, but of a much grosser Fluid, destin'd to some other Use, which *Autopsy* confirms. Yet were both these Opinions true, they are however defective, and the Circular Motion of the Blood unprovided for.

By the way of Transfusion this great *Phænomenon* is naturally accounted for; and the ends, for which the other two *Hypotheses* were devis'd, might both be answer'd with more ease. For the *Hysterick* Arteries transmitting their Blood immediately to the Umbilical Vein, may very easily transmit such Nutritious Juices or Aerial Particles as are contain'd in the Blood, along with it, without depositing 'em by the way. By this means so much of the Impulse of the Mother's Blood is preserv'd, as suffices to maintain that languid Circulation, which a *Fœtus* enjoys. For the Blood being driven through the Arteries of the *Uterus* into the Umbilical Vein, is convey'd directly to the *Sinus* of the *Porta*, and thence by a short and direct Passage through the *Cava* to the Heart; where passing through the *Foramen Ovale* to the Left Ventricle, and through the *Canalis Arteriosus* from the Right and Pulmonary Artery, it is all deliver'd without coming at the Lungs, to the *Aorta*, and from thence again by the Umbilical Arteries to the Veins of the *Uterus*, making a sort of *Epicycle* to the main Circulation in the Mother.

As this Opinion is favour'd by the structure and disposition of the Blood-Vessels on both parts, so there is nothing in it difficult to be conceiv'd, or repugnant to Experience. Late Discoveries have made it appear, that the Arteries and Veins are continu'd Tubes, and that the latter contain nothing but what they receive from the former; and no reason appears why we shou'd think this Method

Transfusion from the Mother to the Fœtus.

Arteries and Veins probably continued Tubes.

Method to be varied in the *Placenta*. On the other hand, if the Arteries of the *Uterus* were continued to the Veins of the same part, and those of the *Fœtus* in like manner, without communicating with each other, their Confluence in the *Placenta* seems to be altogether impertinent and of no use, and the Umbilical Arteries and Vein fram'd for no other Service or Purpose, than to give the Blood room for an idle Sally.

Mr. Cow-
per's Ex-
periment.

Thus the Reasonableness of this old Opinion may be vindicated, but the Certainty of it rests upon stronger Proof. Mr. Cowper, to whose happy Industry we owe the Confirmation of many Antient Discoveries, and the Benefit of some new ones, has the honour to re-establish this Old, but long exploded Truth. For by pouring Mercury into a Branch of the Uterine Artery of a Cow, that went into one of the *Cotyledones* of the *Uterus*, he fill'd those Branches of the Umbilical Veins, which went from that *Cotyledon* to the Navel of the *Fœtus*; which with a part of the *Uterus* he keeps prepar'd by him.

It would be a weak Objection, to alledge that the Observation and Experiment being made on the *Uterus* of a Cow, the Inference would not hold from thence to a Woman, the one being *Glanduliferous*, and the other *Placentiferous*; since every one of these *Cotyledones*, or Uterine Glandules, is in all respects a little *Placenta*, and all the difference between them is in number, name, and magnitude. Why Ruminants differ in this particular from other Viviparous Animals, is beside the Subject of our present Enquiry. But the great Flux of Blood which constantly follows upon drawing the *Placenta* from Women (which is frequently so great as to cost them their Lives) is as plain a Demonstration to Reason of the Continuity of the Vessels, as Mr. Cowper's Experiment to the Eye.

I have heard it objected by very Learned Men, *Objections* that if there were such a Continuity of Vessels, *answer'd.* and such Transfusion of Blood, the *Fætus* must necessarily perish through loss of Blood, upon the Separation of the *Placenta* from the *Uterus*; but that on the contrary no considerable Flux of Blood does follow while the *Fætus* continues wrapt in the Membrane, in which condition it may be kept alive some Hours. To this it may be answer'd, that the Circulation in the *Fætus* being deriv'd from the Mother, may be suppos'd wholly to cease upon the cutting off the Communication between them, till it is again renew'd more forcibly by Respiration. But if we allow the Motion already impress'd upon the Blood to be sufficient to keep it going a little while; yet it must needs be so exceeding languid, that the mere Resistance of the external Air must be more than enough to hinder any Efflux of Blood from a *Fætus* before Respiration. How long Life may be preserv'd without an actual Circulation of the Blood, is a Question not of this Place. But we have been convinc'd by many and notorious Observations and Experiments, that Life has been recover'd a long time after all Tokens of Respiration, Circulation, or even Life itself have disappear'd, so that we can't think the first Solution either impossible or improbable.

I expect to be told, that in the early Days of Gestation in Viviparous Animals there is no *Placenta*, or any Adhæſion of the Umbilical Vessels to any part of the Mother, and consequently no such Transfusion; and that in Oviparous there is no Continuity, or Communication of Vessels of any kind, during the whole time of Incubation. *Want of Continuity before Adhæſion,*

But these Objections carry neither the Weight *Accounted* nor Difficulty along with them, that they may *for.* be suppos'd to do; for in those days there is neither Blood nor Blood-Vessels, and consequently there

there can be no Circulation of the Blood ; and the *Embryo*, of what Species soever, is no more than a Vegetable at that time ; nor does the *Fætus* of any Viviparous Creature enjoy any Circulation, or shew any signs of Animal Life, till after those Vessels, as well as others requisite to the Circulation, are compleated.

And in
Oviparous
Animals.

It must be confess'd, that Oviparous Animals are denied the Benefit of this Communication : But that want is sufficiently compensated by a peculiar Mechanism, which directly answers the Ends of Respiration, and the Pressure of the *Atmosphere* upon the *Fætus*. There is at the Obtuse end of an Egg a small Cavity fill'd with Air, which is the Succedaneous Instrument to the Respiratory Organs. For as soon as the Contents begin to be warm'd by the Incubation of the Hen, or any Analogous Heat of Furnace or Dughil, the several Humours of the Egg acquire a Fermentative Motion, and the Air contain'd in the Cavity or Vesicle at the obtuse end of the Egg is rarified, and the Vehicle extended and enlarg'd ; and consequently the other Contents are compress'd, which the Fermentative Motion naturally resists. But both Bodies being as well compressible as dilatable, and both having an Expansive Motion impress'd upon them by Incubation, the Compression and Renitency will be mutual ; but varied in degree, according as either, through the Variation of Circumstances, shall prevail. By this means, an Alteration of Compression and Dilatation will be produc'd in both answering the Respiratory Motion, by which a Motion will be communicated, which, as soon as the Organs (by which it should be regulated) are compleated, will in the Body of the *Pullus* be Regular and Circulatory.

Use of the
Cavity at
the Obtuse
End of an
Egg.

Mistaken
by Fabri-
tius, &c.

Fabritius ab Aquapendente, and after him our Great Dr. *Harvey*, have assign'd divers Uses to
this

this Cavity or Air-Vesicle, the Extravagance of which have perhaps deterr'd others from enquiring so much into the Use, as the Importance of it requir'd. But tho' I cannot agree to that Perspiration, Refrigeration, and Respiration, which they make it the Instrument of, yet perhaps the Air, that was inclos'd in that Cavity, may thro' the augmentation of the Body of the *Pullus*, and its own Rarefaction, (which is at last so great as to occupy half the Shell) break the Membrane, which separated it from the *Pullus*, and thereby give so much Respiration as to form the chirping Voice, which is often heard before the breaking of the Shell, and with it give an Addition of Strength to enable it to break the Shell. But how it shou'd respire sooner is to me inconceivable.

There are many Problems of great seeming difficulty, the Solutions of which flow naturally from what has been laid down here : But intending to prosecute this Subject farther, and to treat of the Impediments of Respiration, and the Consequences of Respiration obstructed or intermitted, in a Treatise expressly on that Subject ; I shall reserve them for that Opportunity, and content myself here to attempt the *Harveyan Problem* only, which has given abundance of Authors so much Perplexity.

That incomparable Philosopher enquires, *Why Harveyan a Fœtus, taken out of the Uterus with the Membranes entire, shall live in Water some Hours without Communication with the External Air ? whereas if it be taken out and suffered once to breathe, it can't afterwards survive a Moment without the Benefit of Respiration.*

Granting the Fact to be as he has deliver'd it, *Attempted.* which yet is not so in all Cases, the main difficulty is grounded on a Mistake, which from the stating of the Question I find this Great Man to have

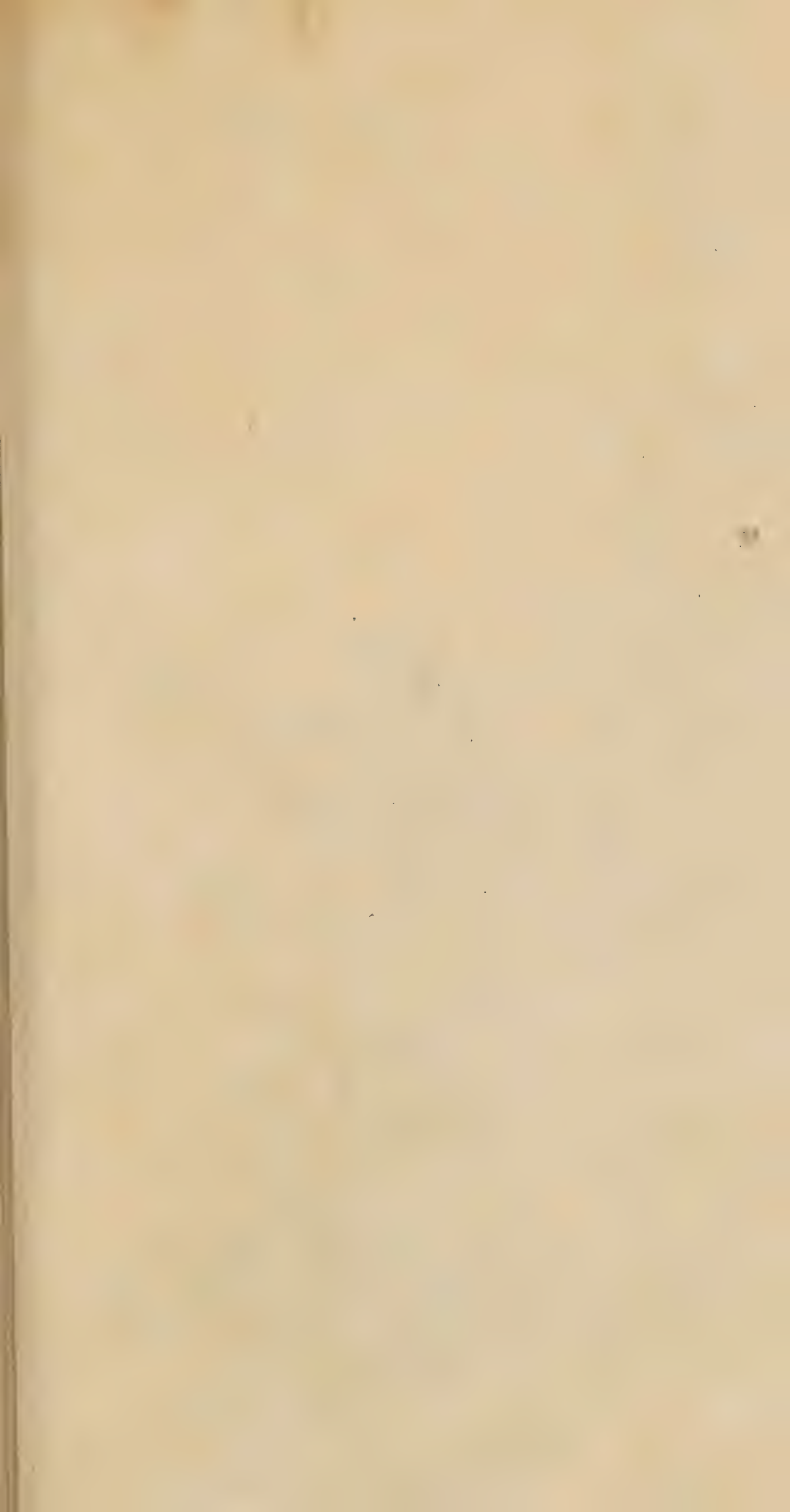
Harv. de
Gen. A-
nim. Cap.
de Partis.

have slipt into. For he thinks, that a *Fœtus* is sooner suffocated after having once breath'd, than if it had not breath'd at all, and that by breathing it had contracted something which render'd it more perishable. *Idem tamen secundis exutus*, (says he) *si semel aerem intra Pulmones attraxerit, postea ne momentum quidem temporis absq; eo durare possit, sed confestim moriatur?* And presently after, *Siquidem constat, fœtum, postquam eum semel hauserit, citius suffocari; quam cum ab illo prorsus arcebatur.* The Doctor observing a *Fœtus* to live longer without Respiration, and to dispense better with the want of Air, while included in the Membranes entire, than it cou'd afterwards; infers thence, that the Air does in the first Act of Inspiration impress upon the Lungs some Quality, which renders it ever after more indispensably necessary. But allowing this Observation, I must yet deny his Inference to be good: For, deprive a *Fœtus* of means of respiring, and then take it out of the Membranes, and it shall be as soon suffocated, as if it had respired before. This proves, that this Necessity of Intercourse with the Air by way of the Lungs is not the Offspring, but the Parent of Respiration, and that, that Learned Man was drawn into a Falacy of *Non causa pro causa*.

Necessity
of Respiration
after
Birth
whence.

The reason of this Necessity is the Pressure of the External Air upon the Surface of the Body, from which it was defended by the Interposition of the Membranes and the Humours contain'd, which are not so compressible, as the Body of the *Fœtus* itself. So soon therefore as the *Fœtus* is excluded, and expos'd to the immediate contact of the ambient *Atmosphere*, the Vessels and all the Cavities of the Body, must necessarily be so compress'd, that the Fluids can't have room for Motion, and consequently the *Fœtus* cou'd have no Life, if Nature had not contriv'd by the

Motion





Vena Pulmonalis

Motion of the *Thorax* to remove and admit that pressure alternately, and thereby to impress a Motion on the Fluids, which is the Spring of Life. But this Motion of the *Thorax* being any way suppress'd, the equal Pressure of the *Atmosphere* on all parts occasions a total Cessation of Motion, which is Death.

I shall prosecute this Subject no farther now, nor trouble the Reader with any Apology for dissenting from those great Men herein named; because, I hope, I have done it with Modesty, and all the Respect due to so great Authorities, and have assign'd nothing which is not matter of Fact uncontroverted, or deduc'd from it by plain Mechanical Necessity.

T A B. XIII.

THE Trunk of the *Vena Pulmonaris*, with its Branches fill'd with Wax, separated from the Lungs, and display'd as in Inspiration.

A A, The Bulbous Trunk of the Vein.

B, Its Orifice ty'd up, when cut from the left Ventricle, close to the Basis of the Heart.

C, The left Auricle of the Heart fill'd with Wax.

DE, The Trunks and Branches of the Pulmonick Veins of the right and left Lobes of the Lungs, in which it's observable those of the right side are larger, and more numerous than those of the left.

C H A P. VIII.

Of SANGUIFICATION and NUTRITION.

THE BLOOD is a warm, red Liquor, circulating by means of the Arteries and Veins, through every part of the Body.

While it circulates in the Vessels, it appears a homogeneous or uniform Liquor, but being let

Blood.

While circulating, an Homogeneous Liquor.

out,

*Separates
when let
out into
Serum
and Cras-
samentm.*

*Proportion
not abso-
lutely de-
termina-
ble.*

*Blood de-
riv'd from
Chyle.*

out, as it gradually cools, it separates spontaneously into two distinct Parts, a *Crassamentum*, or red coherent Mass, and a *Serum* or transparent part which still retains its Fluidity, and being something the more specifically heavy of the two, sustains and bears up the red part which swims in it. The proportion of which two, in the mixt, is ordinarily about one and a half of the *Serum* to one of the *Crassamentum*. I have pitch'd upon this Proportion as a Medium between the Excesses on both sides. But the Reader is not to be surpriz'd, if he sometimes finds the Proportion vastly different from what I have here given, even in Persons of sound Health. For as to this Point, Nature seems not to have settled any perfect Standard, but the Blood of some will be more watry or serous, of others more fibrous, than this Proportion seems to allow; and yet no visible difference be found in the Persons as to point of Health. And therefore I propose this as a Measure of a thing not reduc'd to a Certainty, and in which therefore a great Latitude is to be allow'd.

The BLOOD is deriv'd from the *Chyle*, which, having pass'd the *Lacteals* of the several kinds, is deliver'd into the Blood at the *Subclavian*; whence they pass together to the right Ventricle of the Heart, and there, being yet more intimately mixt, circulate thenceforwards together through the whole Body; till after several Circulations and Depurations at the several Colatures of the Body, they are, as the *Chemists* call it, cohobated, or assimilated, so as to make one uniform compound Mass, which seems to be nothing else but *Chyle* alter'd by the artifice of Nature, and exalted into Blood. For it does not appear that any thing extraneous is mix'd with the Liquor circulating in the Blood-Vessels, but *Chyle*, except what was first separated from it for particular Uses, and what after having serv'd them is re-

turn'd

turn'd to it. Unless, perhaps, it may receive some Portion of Air in the Lungs, which has been a Question much agitated *pro* and *con*, but not yet brought to any certain Decision, by any Arguments that I cou'd yet see for either side of the Question.

That there is a Quantity of Air mix'd with the Blood, and circulating along with it, is past doubt; but whether any more than was at first contain'd in the Bodies, out of which the Chyle was form'd, and was then transmitted along with it to the Blood, is a Question not yet decided. Nor perhaps is it easy to find Arguments that shall be demonstratively conclusive either way. Tho' if there were any Air introduc'd into the Blood by any other Passage than the Lacteals, in the manner already mention'd, it would be a discovery of very great Importance, and that might tend to the Solution of many doubtful Problems in the Animal Oeconomy, if the Way and Method of its entrance cou'd be clearly demonstrated; but that not being done, even for the Lungs, (the most probable way) I shall not presume so far as absolutely either to receive or reject the Opinion.

The Necessity of Respiration, and the florid Colour which the Blood receives in the Lungs, and first shews in the *Vena Pulmonaris*, are the Arguments which those, who contend for the Admission of the Air into the Blood that way, insist most upon. For the first of them, I have already accounted another way, in Chap. VII. of this Book. The latter is chiefly supported by the Experiment of turning the grumous red part of the Blood after Coagulation upon Blood-letting, by which it is observ'd that the under Surface, which was before blackish, being turn'd up, and expos'd to the Air, acquires a florid Colour like that of the Blood in the *Vena Pulmonaris*.

Air in the Blood.

How introduc'd uncertain, otherwise than with the Chyle.

Arguments for mixture of Air with the Blood in the Lungs.

ris, from whence they argue that this Change wrought, is in both Cases by the same means, viz. The Contact of the Air. But for this Change in the Lungs, those that oppose the Admission of the Air, pretend to account by the extraordinary Agitation of the Blood in the Lungs, which they think sufficient by Comminution only to impart the bright Colour.

*Experiment
in favour
of that O-
pinion.*

There is an Experiment indeed which seems to favour the real Admission of Air, which is that keeping the Lungs of a Sheep, or other Animal, in a pendulous Posture, if Water be pour'd into the *Trachea*, till it be full, the Water will first insinuate itself into the Air-Vessels, and thence return very freely thro' the Blood-Vessels. This I have tried very often, but, as I observ'd, it would flow as freely from the Artery as the Vein, which, together with the hydropical Distention of the Vesicles themselves, render'd it suspected to me, that the Continuity of those very tender Parts was broken by the Weight of the Water; and therefore I dare not lay too much Stress upon this Experiment, but propound it only in order to farther and less suspicious Tryals.

*Air the
Spring of
intestine
Motion in
the Blood.*

But whencesoever deriv'd, and how little soever it may be, this included Air is that which gives the expansive Motion or Spring to the Mass of Blood; and consequently is the Cause of the Incarlescence, or Warmth of it, which may thence easily be accounted for, without having Recourse to Acids and Alkalies, or chemical Principles. For Air (wheresoever included) is compress'd, as it must necessarily be in all Liquors, and will endeavour to expand itself; and consequently, if it be strong enough, drive outward the Parts of the Body that enclose it: By which means it causes the Blood to beat against the sides of the Vessels, which having Musculous contractile Coats, do in their turns compress it again, and so cause a reciprocal

reciprocal *Æstus* in the Blood greater than the mere circulatory Motion cou'd ; whence the Parts of the Solids, or containing Vessels, being put into a constant Agitation, as well as the Fluids, a Heat is produc'd in both, which they mutually impart to each other.

Besides this Air, the Blood consists of several ^{Analysis of the Blood.} sorts of Parts ; to some one or more of which, and their mutual Action upon one another, the intestine Motion of the Blood has hitherto generally been imputed. Those which upon the *Analysis* offer themselves to our View, are two sorts, as Salts, and a Quantity of Oil ; which by some nice *Examens* has likewise been found to be of two sorts ; a great deal of Phlegm or Water, and a good Quantity of *Caput Mortuum* ; which however simple it may appear, may for ought we know consist of divers Substances essentially distinct from one another : But for want of sufficient ways of Probation, all that we get out of it is a little fix'd Salt by Incineration.

The Chemists, according to their wonted ^{Chemists} Method and Principles, account for the Colour of ^{Account of the Colour precarious.} the Blood from the Exaltation of its *Sulphur* ; which whether true or false, is *gratis dictum*, and altogether as unsatisfactory as it is arbitrary. However, since the Doctrine of Colours in general is not applicable to Medicinal Use, it is not an Enquiry very necessary to be prosecuted in an Anatomical Work.

However, that accurate sagacious Enquirer, Borellus's ^{Account.} *Alphonfus Borellus*, not satisfy'd with such wide vague Idea's of natural Causes ; thought fit to examine the Ground or *Materia Substrata* of the redness of the Blood, by a Method more simple, and I think, in such Cases, more likely to succeed than the Chemical ; which destroys the Concrete, and with a new Texture introduces new Colours and Appearances. * He took a par-

* De Motu Animalium, Part ii.

cel of the *Crassamentum*, after it had separated it self from the *Serum*, as far as spontaneously it would, and washing it frequently in Water, found, that by that way it was separable into a viscous slippery Substance consisting of white or colourless Fibres, which rises to the Surface of the Water, and there gathers into a Skim, or coherent Pellicle of a reticular Texture, and deep red Powder, which precipitated pretty plentifully to the bottom.

The Experiment shews, that the red Colour of the Blood is imparted to the Blood by particular tinging Particles, as in the common Experiments of *Dyers*, though not so inseparably as many of theirs, most of which they know however very well how to discharge. It might therefore be very well worth that Man's while, who will reason about the Colour of the Blood from the Hypostatical Principles of the Chemists, to examine the red Precipitate apart, and see with which of their Elements it most abounds, which might perhaps teach 'em to be more wary in pronouncing about the Original of Colours; and with this Caution I leave it to their Inquisition.

*Blood not
necessarily
red.*

This fine red Colour, however generally found in the Blood of terrestrial Animals, and most others, is not absolutely necessary or essential to it. For, besides that divers whole Species have their circulating Liquor white or limpid, which I should not scruple to call Blood, I have seen Blood let out to the Quantity of a Pint or more from the *Median* of a Man, which was all of a pure Milk white, which did not when cold separate into a *Crassamentum*, as the red usually does, nor yield a Skim or Cream, nor turn sour upon keeping as Milk does, which to appearance it very much resembled; but remain'd sweet without parting Substances for some Weeks, and at last corrupted and stank; after almost three Months,
and

*White
Blood.*

and that I kept it fluid in a Viol, then a very slight Separation ensued of the whiter part, from a Whey-colour'd Liquor ; but neither was the *Coagulum* near so strong as that of four Milk, nor the Liquor so transparent as *Serum* or Whey, nor either in Smell or Taste inclin'd to be sour, but had at last a Smell pretty strong of Putrefaction. The Man from whom it was drawn was lightly Cachectical, and both his Looks and Complaints were like those of Maids not very far gone in a *Chlorosis*.

Divers other Instances are to be found in Authors, of Blood that was not red ; and Dr. *Lower*, ^{*Broth instead of Blood*} in his Book *De Corde*, relates a remarkable Case ^{*voided at the Nose,*} of one that bled so long at the Nose, that at last ^{*from Dr. Lower.*} the Broth which he drank for his Supper, flow'd, little alter'd that way, as Blood. But that Case of the white Blood, above recited, being the most complete in its kind that I ever saw or read ; a Change made without any accidental Circumstances of Force, or the Attendance of any extraordinary Inconveniencies ; which was in a manner habitual, and did not probably come upon the Man in an instant, or a short time, nor vanish so, but in all Appearance had its leisurely Steps and Gradations ; during part, at least, of which time the Man must live, and do all the Offices of Life, which he seem'd to do in the main as well as others, (especially as such to whom we have above compar'd his State) without what is vulgarly call'd Blood ; I have propos'd it more at large, that they who trouble themselves to reason about the essential Qualities of Blood, may at leisure consider wherein the Defect lay.

The Chemists, perhaps will readily tell us, that Blood is a Liquor more sulphureous than Milk ; and that in this Blood, which resembled Milk so much, the *Sulphur* was not sufficiently

exalted to give the red Tincture which they derive from that Principle.

Colour of
the Blood
from the
Mixture of
Air un-
prov'd.

On the other hand, they who fetch the Colour from the Impregnation of the Air in the Lungs, may fancy a Defect or Obstruction of the Passage of the Air into the Blood in that part, by which means it was defrauded of that Colour or Spirituosity which otherwise it should have had.

Either of these Opinions may be true, but they are both unprov'd, and therefore neither to be insisted on. But there is another Difficulty, which is, that this white Blood, after it had been let out from the Vein above the usual time of Separation, either in Blood or Milk; did not yet follow the Course of either, but still preserv'd its Mixture, without parting into a *Crassamentum* and *Serum*, or into a *Coagulum* and Whey.

Here the Chemists have a fair Opportunity to pretend a Libration or equal Temperature of their Salts; and to say that the Proportion of 'em was such that the Alkalious hinder'd the Acid from procuring a *Coagulum*, and the Acid prevented a speedy Corruption from the Volatile Alkalious, and so betwixt 'em preserv'd the State that it appear'd in, at the first letting out, longer than is usual in Liquors that have had their due Exaltation.

On the other hand, they that hold the Mixture of Air, with the Blood in the Lungs, may (at least with equal Reason) say, that this Blood not having receiv'd in the Lungs a Quantity of Air sufficient for its Perfection and Colour, contain'd yet enough to maintain it in the State of Fluidity, though not sufficient to bring it speedily to Putrefaction, which however it did at last, after an unusual length of Time.

For my own part, who think the Colour of the Blood to depend upon other Circumstances

(not

(not necessary to my purpose) than the Exaltation of *Sulphur*, or the Quantity of Air contain'd in it ; I leave it to the farther Enquiry of those whom the like Observation shall furnish with better means to search into the Cause of it, than I at that time had.

But to return to the History of laudable well-constituted Blood, the visible Elements of it are those which the Laboratories of the Chymists produce separate, tho' perhaps much alter'd by the Furnace. For it is past all Controversy, that the Empyreumatical Oyls drawn from Blood by Fire, differ, *toto Cælo*, from the natural Fat, or Oyl, which circulates with the Blood. Nor is it improbable that the Salts rais'd from Blood, or other Animal Liquors, are in the Operation very much acuated : Or at least, that the various Combinations of 'em by which they were circulated in the Blood, are so destroy'd as to render them quite a different thing from what they were in the natural State. It may likewise be a reasonable doubt, whether that Earth, or *Caput Mortuum*, which remains in the Retort after the Distillation ended, be not a new Production, which had no Existence under any Form resembling that in the Blood it self ; and it is probable that it is the Result of the heavier Salts and Oyls, which being destitute of their more fluid Parts, are in a manner torrefy'd in the Process, and put on a Shape, Consistence, and Rigidity, which naturally they never had.

But this latter Doubt I would not extend too far, because the Nourishment of the Bones, seems necessarily to require something more Solid than Oyl, and less fluxil than Salt, which may serve to give a Consistence, and Temper to those two, of which the Bones by their *Analysis* are found mainly to consist.

Alterations of which the Blood is susceptible.

Coagulation.

Dissolution.

From those Principles or Elements, variously combin'd and distributed by the Circulatory Motion impress'd by the Heart, as has been already shewn, Chap. VII. of this Book, and by the Oscillatory Expansive Motion of the interspers'd Air, and the Re-action, and Resilition of the Contractile Vessels through which it passes, flow all the Properties and Operations of the Blood. From this mixture of Elements and their lax Composition it is susceptible of various Alterations and Impressions, of which the Principal are Coagulation, which almost constantly attends the parts of it, when out of the Body ; but if generally within the Body, it must be Mortal instantaneously ; and therefore such a State of the Blood does not appear ever to have happen'd without Artificial Procurement : Dissolution, which is an Affection just contrary to the former, and is such a Comminution of the Fibrous parts of the Blood, as indisposes it for that separation of the *Crassamentum* from the Serous part, which always ensues in Healthy Blood upon cooling out of the Body, if receiv'd into a deep Vessel. For upon a plain Surface it will not separate. This Dissolution or broken Texture of the Blood is often the consequence of Malignant and Pestilential Fevers, and shews it self in the *Petechiæ*, Purple Spots ; and in many of these Cases the Blood taken away by Phlebotomy, will not separate into a *Crassamentum* and Serous Part. This sort of Dissolution is likewise occasion'd by some kinds of Poysons, among which may be reckon'd the Bites of Venomous Animals, as Rattle Snakes, Vipers, &c. In some of which however the Dissolution is not Total, but Partial, and therefore overcome by proper Applications. Those two contrary Affections of the Blood, when they spring from an Internal Course, arise from the opposite kinds of Salts, Acids, and

Volat-

Volatile Alkalies. For though in an Human *No sincere*
 Body, no sincere Acid is to be found, nor cou'd *Acid in*
 it indeed be consistent with Life; yet it may, *Human*
 and does, often enter the Blood so compounded, *Blood.*
 as to bridle the Volatile Alkalious, which is the
 true Salt of the Blood; and so hinder the due
 Attenuation and Mixture of the several Parts, as
 in the Case of a *Diabetes*, and perhaps in a *Chlo-*
rosis, where the Blood is Thick and Torpid. On
 the other Hand where the Alkalious are too re-
 dundant, and unbridled, or exalted, the Blood
 is render'd too thin and fluid, so that the Discri-
 mination of its Consistent Parts is lost, accord-
 ing to the several Degrees of which follow *Hy-*
permenstruations, *Purple Spots*, *Bloody Urine*,
Sweat, &c.

Another Disaffection which is very frequent *Blood*
 in the Blood, is a too great abundance of Oyls *sometimes*
 or Salt Particles, by means of which the active *over Oily.*
 parts of the Blood being too much clogg'd, the
 Faculties of the Body are not so Vigorously exert-
 ed; and those Parts, which shou'd be separated
 from the Blood, for peculiar Uses, are intangled
 and detain'd; whereby the ends for which they
 are occasion'd by Nature to be separated, are not
 sufficiently answer'd; and perhaps, (which may
 be none of the least inconveniencies of an over-
 Oily Blood) the Solid parts, through and by
 which it passes, are too much Lubricated and
 Suppled, and the Tone of them thereby vitia-
 ted, and consequently their Spring relax'd, and
 their Action impair'd. From hence proceed that
 Sluggish Inactivity and Drowsiness which gene-
 rally attend very Fat People, whose Nerves,
 Membranes and other Tense Parts, are relax'd by
 the too great Quantity of Fat, with which the
 Blood abounds.

The contrary Affection to this, is, the defect *Or over-*
 of Oyl in the Blood, which being, as it were, *charged*
 its *with Salt.*

its Balsam, lines and preserves all the Parts from being Fretted and Corroded by the Salts, whose *Spicula* or Edges are engag'd, and as it were sheath'd in this soft Balsamick Matter, and so kept from attending the Solid Parts, as they constantly do where this is wanting. This *Dyscrasy* of the Blood is usually attended with a general *Atrophy*, and a Fretting or Corroding of some particular Parts: Whence arise Serous Defluxions, Apostemations and Ulcers, &c. to which all parts of the Body are liable in such a State of the Blood, especially the Lungs, whose tender Vesiculous Substance is more easily annoy'd than any other, by the Acrimony of the Salt *Serum*. Whenever this happens, if it be not speedily corrected, a *Phthisis* soon follows, in the *Acme* of which the Lungs become Ulcerated.

The Quantity of terrestrious Matter in the Blood not determinable.

These are the principal *Dyscrasies* or Disaffecti-
ons of the Blood, relating to its Temperature, and
due Mixture. For as to its Terrestrious part, or
Element of Earth, the Excesses or Defects of
that are not so notorious, and consequently the
proportion which it holds to the rest, is not so
easily to be discover'd and adjusted, unless per-
haps the Cretaceous *Tophi*, and Calculous Concre-
tions so frequently found in Animal Bodies, may
be said to be the Product of a redundance of
Earth in the Blood. But if that be so, this *Dys-
crasy* does not shew it self very apparently in the
Blood, by any thing but its Effects, neither does
it afford any clear Indications. For those that in
these Cases Physicians have been able to find, are
generally drawn from the excess and kinds of the
Salts, which are always combin'd in great Quan-
tity in this sort of Concretions; and all the Scope
that they rationally drive at from their Preserva-
tive or Curative Indications, is to prevent those
Coagulations, of which they look upon the Salts
to be the Cause, or to dissolve them when but
loosely

loosely form'd. For whatever farther some may pretend to in these Cases, is but the vain Boastings of Charlatans and Empiricks who Cheat the People with their Pretences to infallible Dissolvents of firmly compacted Stones, which they impudently pretend to have done, whenever, by the ordinary means disguis'd, they happen to drive out any loose unknit Gravel, or small Stones.

All the other *Dyscrasies* of the Blood discover themselves readily enough to the Eye, the Touch, or the Taste of a diligent Judicious Enquirer. But this only betrays it self none of these ways, and is to be found out by Reasoning, and Consequences drawn from Hypothetical Causes; in which we may easily be deceiv'd, tho' there be a necessity sometimes of using them. We can easily see whether the Blood be of greater, or less Consistence, than in a State of Health it ought to be: We can see and feel whether it abounds with Serosities or Oyl: And we can taste or even feel the Asperities of the Salts: The Earth only which is esteem'd the grossest of all the Hypostatical Elements eludes all these Tryals, and leaves us to find it in its Effects.

However, as the Excesses and Defects of the other Elements are the most discoverable, so are they likewise the most important; and by their various Combinations and Complications produce most of the Diseases of the Humours of the Body; and therefore the Constitution of the Blood shou'd upon all occasions of Phlebotomy be nicely inquir'd into with more Curiosity and Exactness, than I doubt Physicians generally use; who ordinarily content themselves with a superficial view, or perhaps a slight Taste with the end of the Finger: Whereas they ought in many Cases to feel carefully, and examine by their Touch the Degree of Cohæsion and Tenacity in the Grumous part after separation, as well as the Smooth-

Smoothness and Oleosity of both parts : And if they did by frequent weighing a stated Measure, examine the Specifick Gravity of Morbid in different Cases, and of Sound Blood likewise ; they might perhaps arrive at a Standard of the Quantity of Air contain'd in them, and thereby discover when the Disease proceeded from an Excess, or Defect of Air incorporated in it. It is certain that the light, loose Observations made upon Blood by our Chirurgeons, and Blood-letting Apothecaries, are very superficial and unsatisfactory, and the Judgments that they make upon them generally Erroneous and False ; for minding only the Superfice and Colour, or perhaps the appearing Quantity of *Serum*, they roundly pronounce it Good or Bad, Rich or Poor, without minding any other Circumstances. Thus if the Colour be Florid and Gay, they readily commend it for good Blood, although perhaps it be Hypochondriacal or Flatulent, or have in it the Rudiments and Tokens of an Incipient Inflammation ; in both which Cases the Blood will be very florid, because the Texture of it is pretty loose and broken. But having heard that there were such things in the Blood as Red Globules, from which indeed the *French* Physicians, and Philosophers have upon the Score of the Figure generally deriv'd the Redness of the Blood (tho' according to the Doctrine of that Incomparable Mathematician and Philosopher Sir *Isaac Newton*, Red being the Colour least Refrangible and least Refracted, the Globular Figure is of all others the least apt to produce that Colour as being the most Refrangible) they conclude the Globules of the Blood safe and entire, and consequently all else well. On the other Hand, when they see the sizy Pellicle, they presently cry out of Acidity, which causes in their Opinion that stiff *Coagulum*. Whereas it is the Product of the direct

*Sizy Blood
no Argu-
ment of
Acidity.*

rect contrary, and is only a mixture of the aqueous and Oily part of the Blood by means of too much Volatile Salt, which by an intense Heat are inseparably incorporated, as appears by the stiff Jellies produc'd in the Digestor mention'd, Chap. XIII. B. I. which both in Colour, Consistence and Tenacity, resembles the Sisy Skin, which by its appearance always on the Surface, shews it self to consist of the lightest Parts of the Blood. The visible Changes that happen beyond these are generally matter of Surprise, not Instruction to them, and are usually the Objects of their Wonder, not Judgment; which it is not to our present purpose to Prosecute here, it being sufficient to have given a Hint to the Judicious Inquirer, whom I pretend not so much to inform, as to excite.

There are other Disorders in the Blood, which do not Originally spring from any *Dyscrasy* or undue mixture of its Elements, but from an Alteration in the Motion: Such as an Augmentation or Diminution of the Degree of Velocity in the Progressive Motion: Or the same Changes in the Degree of the Expansive, by which Supernatural Fermentations are induc'd, or the necessary ones damp't and check't, and the Progress of the Blood too much hurry'd, or retarded, which depend upon various Causes, very different from one another: As sometimes on matters taken in *ab Extra*, as in Fevers and other Disorders occasion'd by Surfeits, Debauches or Drugs, sometimes by too violent Exercises or catching Cold: At other times by some latent Malignity, or Indisposition of the Air, from whence proceed Epidemical Diseases; and very often by some vitious peccant Humours generated in the Body it self, and reassum'd into the Blood, which are too many to be enumerated here, without entring into a Detail of almost all the Diseases of the Blood.

Ch. XIII.
of Digestion.

Other Alterations in the Blood.

*Ataxy of
the Spirits,
a ground-
less preca-
rious shift.*

Blood. In this sort of Disorders the Spirits are too often accus'd, which is so convenient a shift, and so fitted to be employ'd on all occasions, that it is grown almost the common *Asylum* of all baffled Reasoners; who, when they are puzzled, need do no more than lay the Fault upon the Spirits, and the difficulty is over without any trouble; For they are always at Hand to bear the Blame. But, this is explaining *Obscurum per Obscurius*, till some Body or other gives us better Demonstration of their Existence, Nature and Operations, than our Ignorance, and want of something to fill their Place, and stop a Gap in our Philosophy, have done.

*The Solids
promote
the Circu-
lation.*

The Solids likewise have their share in the disorderly Motions of the Blood; for according as the Tone of the respective parts, thro' which the Fluids pass, is over-tense, or too lax, the Motion of the Humours will be promoted or retarded thereby. For in case of over-tension of the Vessels, the Pressure of the Fluids will by the Resilition or Elastick return of their *Parietes* be reverberated with greater Strength, and consequently a greater Motion will be thereby impressed upon them, and the Celerity of it increas'd in Proportion. But, in a Relaxation or *Atonia* of the same Vessels, the Expansion of the Fluids, towards which they have a perpetual tendency from Causes already mentioned, will necessarily be greater from the yielding of the Vessels; but the Progressive will lose some of its Celerity for want of the Repercussion of their sides upon the Fluids, as it does in the Veins; which Resolution of the Tone of the Solids may be one Cause of those Symptoms, which constantly attend *Epilepses*, and other Spasmodic Distempers.

*Nutri-
tion,
whence.*

The Blood, thus variously compounded, and circumstantiated, visits even the Minuteſt Part of the Body, by means of the Circulative Motion :

Of

Of the Impulse and Causes of which, and the passages through which it is perform'd, an Account has been already given, which needs no Repetition here.

In this Round, those Particles of the Blood which conform best to the Figure and Structure of the Parts thro' which they pass, are apposited to them either for their Augmentation, which is called Accretion : Or for the Reparation of such, as by the Constancy and Rapidity of the Circulatory Motion of the Blood must needs be worn off from them.

About the matter from whence this Nourishment is deriv'd, great Contests have arisen among Physicians and Anatomists ; in which this only has been a Point agreed upon by common consent, that among the various Humours of the Body there was one peculiar destin'd and contrived for that Office, but which that is, has been the Dispute. In which, if I may have leave to speak so freely of great Authors, they have in my Opinion, shewn more Reading, Learning, and Subtilty, than true Understanding of the Point in Question.

Some have contended for a Nutritious Juice to be convey'd through the Nerves, in which some great Men of our own Countrey have been the principal Misleaders : Some have set up the Lymph ; Others the Chyle, as the Universal *Succus alibilis* : Some have appointed the *Serum* or *Albumen* of the Blood, (which to intimate it once for all, I take to be the same thing with the Lymph) for that Office, which others assign to the *Crassamentum*. And there are some who out of several Elementary parts of each, or all these, make various Combinations according to their own Fancies, from whence they have formed an almost innumerable variety of *Hypotheses* : All of them carrying seeming Probability, yet none of them

*Contested
by Au-
thors.*

*Various
Hypo-
theses.*

them Conviction, at least not to me. The Reason of this Miscarriage of so many great Wits, seems not to be any want in them of Qualifications sufficient for such Inquiries, but that the Matter is in its own Nature not precisely determinable.

*Blood
commonly
agreed to
be the Ve-
hicle of
Nutriti-
ous Par-
ticles.*

However all these (except they who bring a Nutritious Juice thro' the Nerves) agree that the Blood is the Vehicle, that conveys the Alimentary Parts, through all the Body, whatsoever they may be, and whencesoever deriv'd. But perhaps upon the Score of its Heterogeneity or Composition of different Elements, they did not make that it self the Nutritious Fluid without restraining the Faculty of Nourishing to some particular parts of it, as thinking the general Account too vague and indefinite. I must confess my self of another Mind, and own, that I think all those precise Determinations to be too narrow and restrain'd, and that the Blood in its largest acceptation (including all those parts which have been before describ'd as belonging to it) is simple and homogeneous enough for the purpose of Nutrition.

*No parti-
cular Nu-
tritious
Juice.*

I conceive therefore that all the specifically different parts (be they more, or fewer than those we have already describ'd) which Circulate together in the Vessels under the common Name of Blood; do contribute something either Instrumentally or Materially to the Augmentation or Reparation of the Parts through which they pass: But how much each precisely for its share does separately contribute, I do not pretend to know: Nor indeed to be able to say, that the Liquor, which we call Blood, consists precisely and exactly of so many Elements or Parts simple, as to Sense, and our *Analysis*, and no more.

There-

Therefore before I proceed to lay down my own Notion of Nutrition, it will be necessary to say something concerning Sanguification, another Point which has been very much canvass'd among the Learned ; but in my Opinion with as little Fruit and Satisfaction as the former. I shall not therefore trouble my self, nor the Reader, with the Discussion of such steril Questions, as whether the Liver, the Heart, or the Blood, &c. sanguify, which serve rather to try the Wit and Invention of Young Students, than to inform their Judgments.

By Sanguification is generally understood the Affimilation of the *Chyle* into Blood, which is suppos'd to be compleat, when the whole Circulating Mass is saturated with a high Red Colour, and upon Phlebotomy separates in the Basin into a red *Crassamentum*, and an Amber Colour'd *Serum* only, without any white Matter floating loose on the Surface, as the Chyle before perfect Affimilation will do.

The Physicians of the last Century, upon the Introduction and Reception of Chymistry, suspecting almost every thing in a Human Body to be done by Ferments, and among the rest Sanguification ; were therefore very solicitous to circumscribe and fix it to the proper *Officina*, where they suppos'd this Ferment was prepar'd, or at least to be found ; and great Disputes there were among them about it. Hence the Liver and the Spleen had sometimes their Triumphs, sometimes their Obsequies sung, as a fresh Champion or Adversary arose for or against their Cause. But I shall not here trouble the Reader with any thing more particular about the Notion of such sort of Ferments, or these Topical Sanguifications. Neither shall I disturb the Ashes of the Plastick Powers and Faculties of the Antients long since deceas'd, since no body is in danger of reviv-

ving those Doctrines again with any Prospect of Success.

Sanguification gradual. First Degree.

Of Sanguification we may admit two Degrees, the first of which amounts to no more than a Confusion, or such an intimate mixture of Parts, as suffices so to confound the different colour'd Liquors, as that the whiteness of the *Chyle* shall be so lost, or drown'd in the red Colour of the Blood, as never more to appear again in its own Shape and Colour ; to which, how many Circulations are necessary, is hard to determine. However, he that considers the several Motions, as well Intestine as Progressive, will easily allow them sufficient to produce such a mixture in no long time.

Second Degree.

The second Degree of Sanguification, is when the parts of the Chyle are so exalted, or comminuted and subtiliz'd, as to lose entirely their former tendency to a Coagulatory Separation, such as in Chyle and Milk they have. In the spontaneous Separation, or curdling of which latter, there is a Concurrence of a manifest Acid, which in the Separation of the parts of Blood is never found, not even in the most Morbid Case, that ever I cou'd hear of.

Why two Degrees only mentioned.

I have mentioned but two Stages or Degrees of Sanguification : One, while the Mixture is gross and confus'd only ; and the other, when the Parts are comminuted and united, which seems to give us a sufficient Idea of perfect Blood ; tho' there may be, and undoubtedly are, several Steps or Degrees between these, which we neither need, nor indeed can distinguish by any sufficient Tokens, for want of knowing how many Circulations are necessary to make a perceptible Alteration in the aggregate Mass. However, there is a farther Degree in which the Parts are yet more exalted and subtiliz'd. But this being beyond what is salutary, I account the Sanguification

tion

tion perfect without it. This latter is that State in which the Fibres and Filaments of the Blood are so broken and blended with the aqueous Parts, as not to be again separable from 'em ; which therefore I esteem a Morbid Sanguification, such as happens in Pestilential and other Fevers, which are attended with *Bloody Sweat, Urine, Spots, &c.* and in which the Blood will not separate when cool, though out of the Body.

All these Degrees, whether imperfect, perfect, *Circulation* or morbid, are procured by reiterated *on the* Circulations ; in which, as well the intestine as progres- *main In-* sive Motion, conspires to the effecting the Mix- *strument* ture and Comminution of the adventitious Parts, *of Sanguif-* and undoubtedly have their stated Period, in which they arrive at Perfection ; tho' where precisely to fix that, is unknown to us. But that it is so, is plain by the Crudity of the Chyle, which may be found by letting Blood after a full Meal, in which the Chyle will appear distinct after many repeated Circulations, and by the too great Fluidity or over-intimate Mixture which appears in that State, which we call the Morbid Sanguification ; in which there is undoubtedly the Concurrence of some collateral Cause, besides the natural Motions of the Blood ; because it is found in some peculiar Distempers only, tho' there may be many Degrees of Excess of Exaltation, beyond the due State, before it arrives at that inseparable Pitch of Fluidity which manifests itself plainly to us ; but being unheeded, and perhaps not cognizable by any visible Token, we cannot account distinctly for 'em. It would indeed be of very great Service towards the Cure of Distempers, if such adequate Tryals could be invented, as might discover the several Gradations towards or beyond salutary Sanguification. But these being yet un-invented, must be left to future Industry and Sagacity.

*Sanguifi-
cation and
Nutrition
equally
perplex'd.*

By this Account of Sanguification, however rude and unaccurate, it will be obvious to any considering Person, that the same Difficulties that occur in settling the distinct Steps of Sanguification are to be met with in Nutrition also: For, whatever the nutritious Particles may be, it is plain that from the first Admission of the Chyle into the Blood, their Motion is confounded with the Motion of the Blood, and conformable to it, and consequently that no distinct Account can be given.

*Nutritious
Matter
various,
according
to the Pores
of the
Parts.*

Whatsoever Notions therefore speculative Men may advance about the distinct and gradual Motions of the Nutritious Matter; and whatsoever Distributions they are pleas'd to make of this sort of Matter to one part, and that to another; they exist in Imagination only, and admit of no Proof, nor indeed any regular Examination. For as the nutritious Juice, or Juices, are mix'd, and circulate with the Blood thro' all the Parts of the Body; all that we can distinctly conceive of 'em is, that as the excrementitious Parts are in their Passage separated into specifically distinct Fluids, by means of Glands, whose Pores are adapted to receive such Particles only as when they come together make such a peculiar Species of Fluid; as the Urine, which is separated by the Kidnies, the Bile by the Liver, and the *Saliva* by the Glands about the Mouth, &c. So we may conclude, without offering Violence to Reason, or straining Inferences; that the Pores of the Parts to be nourish'd, are so figur'd and form'd, as to retain those peculiar Particles which conform best to 'em. But we cannot with any Foundation pretend to tell what sort of Particles each Part retains, unless we knew distinctly likewise how the Pores of those Parts were dispos'd, and cou'd tell precisely what Parts they were capable of receiving, and what only: Which is a Degree of Knowledge

Knowledge I doubt no Man has ever yet arriv'd at.

The *Analysis* indeed of the Parts does give us some gross Idea of the Materials whereof they were compounded, if we suppose that the Bodies which we separate, pre-existed in the Blood, such as they then appear. But even thus we cannot carry our Speculations to any great Nicety. For all the Parts of an Animal (at least of those which we call perfect) yield the same Substances upon the *Analysis*, and the difference is only in the Proportion. This holds true even betwixt the Fluids and the Solids, some affording more Oil, others more Salt; some more Phlegm, and others more *Caput Mortuum*; which, (if we allow it to be an uniform Body, such as existed before) we may call in Earth to make up the Number of Elements. But whether these were not form'd in the Body, by the Coalition there of Particles of Matter yet more simple, remains still a Doubt so weighty, as will render all Conclusions of this kind from the *Analysis* very precarious.

This being the best Guide we have, it might perhaps be better to rest contented with such a *Rationale* of Nutrition, as may fairly (without straining or supposing) be deduc'd from the Mechanical Properties and Actions of the Bodies, nourishing, and to be nourished.

Let us therefore consider the Blood or circulating Fluid, as a compressible Elastick Body; and the Vessels or Solids, which they permeate (at least most of 'em) as Expansile and Contractile, capable of being dilated, and endued with a Faculty of Resilition or Restitution; which Properties will furnish us with a Mechanical Idea of Nutrition in general. For the Blood having besides its Progressive Motion an Expansive one, which derives from the included Air; which being rarified by the innate Heat of the Body,

Blood a compressible elastick Fluid.

*Nutrition,
how per-
form'd.*

expands with it all the Parts of the Liquor with which it is mix'd, and thereby pressing upon the sides of the Vessels extends and dilates their Pores, and so makes way for those Particles of the Fluid, whose Figure admits of it either to slip through those Pores; or to insinuate themselves into 'em; where by the reciprocal Contraction or Refilition of that Vessel, the Pores being again straitned, they are fix'd; and so become a part of it, and supply the Loss of those other Particles, which by the continual Affriction, or rubbing of the Fluid upon those Vessels, may have been abraded; and so by the natural Consequence of their Mechanism, the same Fluid may be conceiv'd to repair the Decay it would otherwise occasion. I know some will not grant the Solids to undergo any such Loss of Parts; and consequently will not allow 'em to have any need of Reparation or Nutrition, after they have obtain'd their full Dimensions. But if they consider how fast a continual Flux of Water, which is not by infinite Degrees so rapid and forcible as that of the Blood, will wear even Stones; they will be hard put to it to shew how the Parts of the Body, which are comparatively so very soft, should endure so constant and so violent a Flux of Humours, without decay.

*Why greater in
young Bodies.*

In young Bodies, where the Vessels are much tenderer, not only the sides are amplified by this Expansive Motion, and their Dimensions that way encreas'd by receiving more than they lose; but by the progressive Motion, which naturally and strongly pushes forward, and would not return but for the Bar and Check, which they receive at the Extremities of the Vessels; the containing Parts are gradually stretch'd in Length, and by the Matter which insinuates itself every where into the Pores, are hindered from returning exactly to their first Dimensions; by which means they

insen-

insensibly vegetate or grow ; which they continue to do, till the supporting Parts, the Bones, growing by degrees rigid and firm, admit of no farther Extension ; and thereby put a Stop to the farther Growth of the more flexible and yielding Parts, which are ty'd to, and limited by them.

Thus the Dimensions of the Body, as to *Growth,* length, are circumscrib'd to that precise Stature, *how circumscrib'd.* which it had at the time when the Bones first acquired that unyielding Rigidity. And these Dimensions every Limb maintains during the rest of Life, unless by Accident a Bone be broken, or by any Distemper softned again, and render'd pliant ; in which Case the other Parts follow the Figure and Dimension of the Bone : As when it happens that the fractured Parts of a broken Bone are not rightly put together again, as it often falls out in the Bone of the Thigh ; where the under part not being brought to correspond rightly with the upper, the Weight of the Body making the upper bear downwards, they slip along each other, and the Leg is thereby shortned. The same thing happens without a Change of Dimension of the Bones themselves, if the Head of the Thigh-Bone be turn'd out of its Socket in the *Ischium* ; in which Case the weight of the Body makes the Trunk bear downwards, and the Flesh yielding for the Head of the Bone to rise, the Leg appears shortned.

What it is that determines the yielding of the Bones to a stated time, pretty nearly agreeing, almost always in all Persons, is hard to tell. All that appears certain in it, is, that this Rigidity of the Parts comes on gradually, and that from our first Conception to that time, the Encrease is by Degrees less and less every Year ; perhaps every Month, every Day, were we able to adjust our Observations so nicely as to calculate it.

I am not ignorant that many times the Growth receives a Check from some contingent Circumstances, of which we are not aware ; and returns again when they cease tho' insensibly to us. In Diseases we are indeed aware of this sometimes, and think we know what to impute it to, though even that we cannot do precisely.

*Fluids
more tender in
young Animals
than old.*

But it is not the solid Parts only that are tenderer in young Animals than in grown ones ; but the Fluids themselves are much more soft, and as it were gummous, as we find by that Juice which we call the Gravy, which the younger the Meat is, the more gelatinous it is.

*Whence
this happens.*

This seems to shew, that from whatsoever Element they are deriv'd, or however compounded, the nutritious Parts are fibrous, soft and gelatinous ; and that consequently the less they are comminuted and subtilized, the fitter they are for Nourishment. Hence it comes that the Blood of Children, having undergone few Circulations in proportion to grown Persons, is in the same Proportion more nutritious, and the Parts which are form'd out of it more soft, flexible and yielding ; which Softness, by length of Time and repeated Circulations, the Fluids as well as Solids gradually lose, till the latter resisting the Impulses of the Blood, a Stop is put to their Growth.

*Bones,
whence
form'd.*

From hence also we may conclude, that Bones are form'd out of the most comminuted or broken Parts of the Blood, since we see that the Blood of old Men, which by a long Course of Circulation becomes in a manner even unfit for the common Course of Nutrition ; will however generate Bones, and convert into that sort of Substance many of the Tendons and Ligaments, and even the Coats of the Vessels themselves ; whose Substance being next to the Bones the most compact, admits only of the smallest Particles of the
Blood,

Blood, which therefore soonest become osseous, as they are frequently found.

This Theory may furnish us with a reasonable *Dr. Sydenham's Problem consider'd.* Solution of that Problem which Dr. Sydenham propounds as unanswerable, and as an Argument against the Use of Theory in Physick; why a Horse, or any other Animal, arrives at his *Acme*, meaning his full Strength and Vigour, at a determinate Age; for tho' we cannot tell by what Proportions and Degrees this Softness both of the Humours and solid Parts wears off; yet we find that it gradually does so, and that all sorts of Animals have a stated Period of Time, in which the Circulations have reduc'd the Solids to such a State of Resistance, as to admit no longer of a Vegetative Encrease; and that gradually as this Vegetation declines, the Strength encreases; which depends upon the Resistance that the Solids make to the Fluids, in which consists the Strength of Muscles. For the Action, or Force of a Muscle, consisting in the Resistance which the Muscular Fibres make to the Effervescence of the Blood, or other Fluid included in the Belly of the Muscle; the Animal is then strongest, or in his greatest Vigour, when his Muscles are able to make the stoutest Resistance; which is when they will no longer admit of a permanent Distention, that is, when they have done growing.

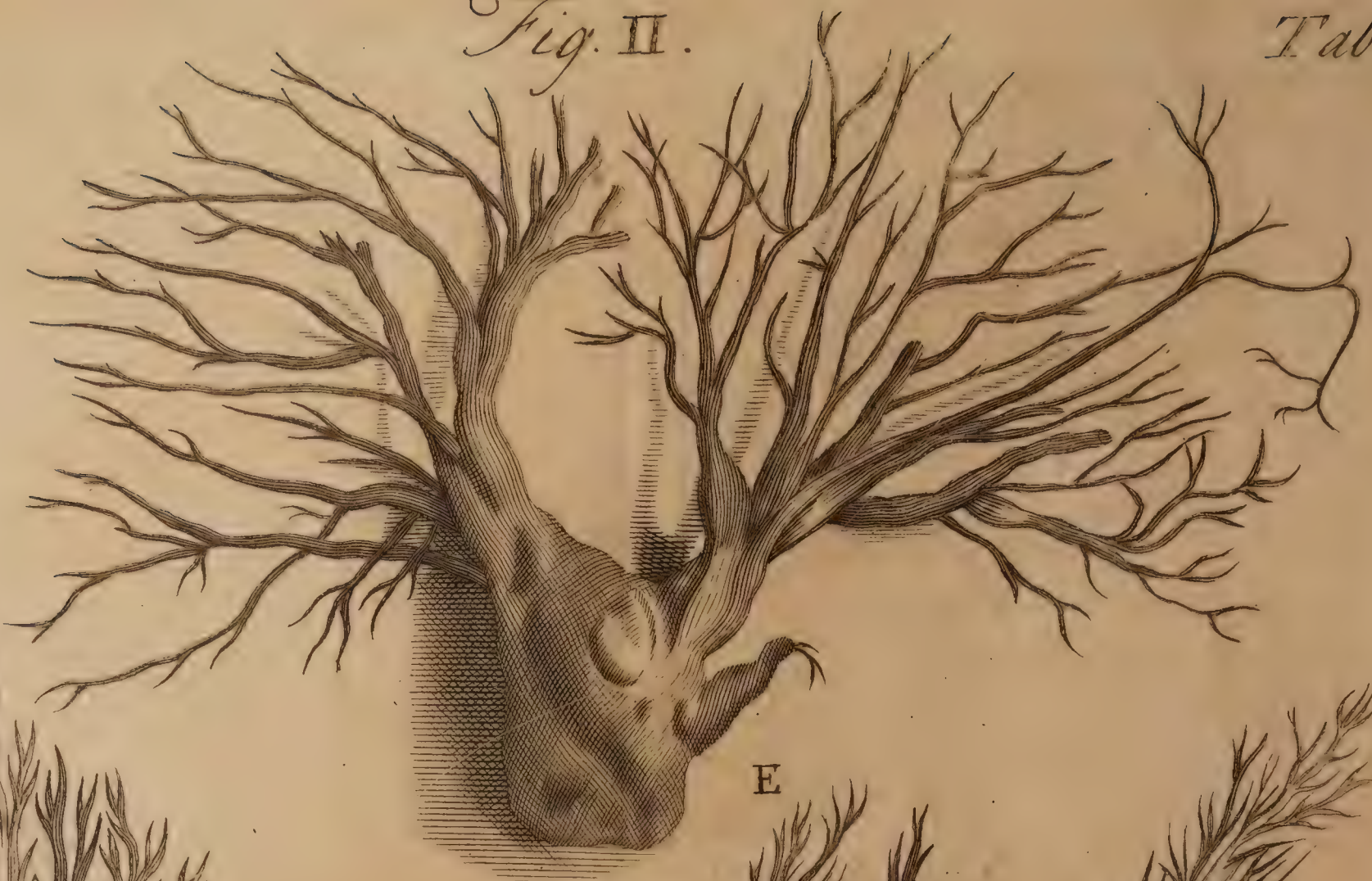
It may be objected, that the Resistance of the Vessels is yet greater in aged Persons, and that according to this Theory it must be so; which notwithstanding is attended with Stiffness, want of Strength, Vigour and Heat, which is confess'd.

But these things depending (as has been already shewn) upon the mutual Action or Reaction of the Fluids and Solids upon each other; as the solid Parts grow stubborn and unyielding to the Impression

Impression of the Fluids ; so they lose their Elasticity, or Faculty of Resilition, or Restitution, by which the Motion of the Blood itself was invigorated and promoted ; and by this Rigidity of the Vessels the Blood is reduc'd to a mere circulatory Motion, such as is impress'd by the Impulse of the Heart only, without any room for the expansive ; upon which all the vital Actions depend, as much (at least) as upon the Progressive, though both be indispensibly necessary.

But, besides this Indisposition of the Vessels, (which from the Theory laid down, unavoidably attends Age) the Humours themselves, by long Attenuation, grow so much assimilated or homogeneous, that the Fermentation, or necessary Expansive Motion, is but ill maintain'd ; thro' which Defect, together with that of the Vessels, the Circulation itself languishes, and all the vital Faculties gradually decay with it ; 'till, if no Accident supervenes to hasten Death, which a little one in these Circumstances will do ; Nature it self fails, and they drop, like over-ripe Fruit, as it were, spontaneously and of course, into the Grave.

This Theory (as little able as we are to be precise and exact in it) will enable us to account for more *Phænomena*, and is capable of more Improvements, than any drawn from particular Humours, without any Force upon Nature, and running into Suppositions not warranted by the Mechanism of the Body. But, if it be (as I think) true, it suggests a way of preserving our selves longer than ordinary, if regular and early Care were taken ; of which having no room to speak here, I shall reserve it to a farther Opportunity, and in the mean time leave it to the Consideration of others.



T A B. XIV.

F I G. I.

THE Pulmonary Vein, with the Branches nearer each other, as in Expiration. *N. B.* The same Letters of Reference with the preceding Table, explain this likewise.

F I G. II.

A *Polypus* taken out of largest Ramifications. this Vein answering its



A NEW

A N E W
S Y S T E M
O F
A N A T O M Y.

B O O K III.
Of the H E A D.

C H A P I.
Of the containing Parts of the H E A D.

OF the containing Parts of the H E A D, some are common, some proper.

The common are the same with those of the rest of the Body, which are the *Cuticle*, *Cutis*, *Membrana Adiposa* and *Panniculus Carnosus*.

Skin.

The Skin itself is various in different Parts of the Head. On the Scalp, especially the hinder of it, call'd *Occiput*, it is very thick and hard, on the Face it is thin, soft and smooth, but on the Lips thinnest of all.

Fat.

There is a very little Fat about the Head.

The

The *Panniculus Carnosus* is plainly Muscular in the Fore-head of some, by means of which they move the Skin of the Fore-head as they will. Others, in whom the Occipital and Frontal Muscles join their Tendons, can move the whole Scalp of the Head.

On the outside of the Head, out of that Part which is call'd the Scalp, spring the Hairs; which though many have taken a great deal of unnecessary pains to exclude from the Number of the Parts of the Body, yet being the Product of it, and containing something very curious in their Structure, are worth a short Account. They are observ'd by the Microscope to be hollow, and furnish'd with a multitude of Vessels; and however to us they appear to be simple and equal, the Microscope shews them to be knotted like some sorts of Grass, and to send out Branches at the Joints. Their Cavity has been otherwise prov'd by the Distemper call'd the *Plica Polonica*, in which the Blood itself has dropt through the Hairs. But I have never seen this Case, and am apt to doubt, whether the Blood that issues be not sent from other Vessels, and only runs externally from the Hair to the Extremity.

As for the Branching of the Hair 'tis pretty visible at the Extremities, without a Microscope, for 'tis very apt to split (as the Hair-Cutters call it) especially if it be worn long and kept dry. This division of the Extremity, (which to the naked Eye seems to consist but of two or three Hairs) by the Microscope appears to be a Brush of Hair.

Each of these Hairs has a little Bulbous or Oval Root in the Skin, which sometimes adheres to it, so as to be pluck'd away with it.

They are commonly reputed an Excrement, and esteem'd to be nourish'd by such. But, whatever the matter of their Nourishment is, it seems

seems to be more simple than the other Humours of the Body. For long after Death, when all the other Parts and Humours are putrified and corrupted, the Hair will vegetate and encrease, which it appears to do so long as any Moisture remains in the Part.

*Proper
containing
Parts.*

The proper containing Parts of the Head are strictly in Number but two, the Muscles, and the Membranes: Of the first of which we shall speak hereafter in its proper place.

*Mem-
branes.*

Some make two containing outward Membranes, the *Pericranium* and *Periosteum*, which are in reality but one double Membrane consisting of two Coats, as most others do; of which the exterior is by some, by a distinct Name, call'd *Pericranium*, and the inner *Periosteum*, as lying immediately upon the Bone. This Membrane is pretty firmly connected to the *Dura Mater* by several Fibres transmitted from it to that Membrane through the Sutures of the Skull.

*Connexi-
on.*

Division.

About the Temporal Muscles, these two Membranes part, the outer going over the Temporal Muscles, and the under remaining still close upon the *Cranium*. Which division, though common to the Processes of divers other Membranes, has occasion'd their being reckon'd distinct, and diversify'd by two Names.

Cranium.

The *Cranium* may be reckon'd the Basis of the Head, and therefore not to be reckon'd among the Parts simply continent. But of that, likewise, more in another place.

C H A P. II.

*Of the MENINGES or MEMBRANES containing
the BRAIN.*

IN order to the Dissection of the Brain, the *Way of*
Skull must be saw'd through the middle of *opening*
the Temporal Bones, and of the Bone of the *the Skull.*
Forehead, and through the upper part of *Os Oc-*
cipitis; which being carefully done, so as not to
wound the Membranes lying under them, the
Skull must be gradually heav'd up with a Lever.
The top of the Skull being thus loosen'd from
its Basis, by a sudden Jirk at the *Os Frontis*, it
will be successfully freed from the *Dura Mater*,
that adheres very close to it by Fibres and small
Blood Vessels which perforate the Skull, especi-
ally at the Sutures.

The Skull being open'd, first the Membranes *Order of*
containing, then the Brain, next the *Cerebellum*, *the Ap-*
and lastly the *Medulla Oblongata*, with all their *pearance*
Vessels present themselves to the View. *of the*
Parts of

Immediately under the Skull, lies a thick tough *the Brain,*
Membrane, call'd *Meninx Crassa*, or *Dura Ma-* *&c.*
Meninx
ter, which covers the whole Substance of the *Crassa.*
Brain, and Spinal Marrow, and affords likewise
a Coat to the Trunks of the larger Nerves.

It is connected on the upper-part to the *Pe- Connexion.*
riosteum, by means of Fibres (already describ'd)
which pass through the Sutures from one to the
other. On the under-side it is ty'd to the *Pia*
Mater, by the Branches of the *Sinuses*, and by
the Arteries and Nerves.

This Membrane consists of two Coats: The *Coats.*
Exterior hard, dry, and somewhat rough: The
Inner more smooth, soft and moist. It descends
double between the two Hemispheres of the
Brain,

Falx.

Brain, which it divides, as deep as the *Corpus Callosum*, and by reason of its Curvature occasion'd by the Convexity of the Brain, it is in that part call'd *Falx*, from the Similitude which it bears to a Sickle. It likewise insinuates itself between the Brain and *Cerebellum*, and by that means hinders the Brain from lying too heavy upon the *Cerebellum*.

Sinus.

In these Duplicatures are several Cavities call'd *Sinuses*, which are a sort of Venous Channels form'd for the Re-conveyance of the Blood, and plac'd between the Duplicatures of this Membrane. Of these, Four only are considerable.

Longitudi-
nales.
Fig. i.

The First of these call'd ordinarily *Sinus Longitudinalis*, runs along the middle of the Convex Part of the Brain from the *Crista Galli*, to the hinder Part of it, where it is divaricated, sending out on each side between the Brain and *Cerebellum*

Laterales.

a Branch, which are call'd the Lateral *Sinuses*; and besides a third Branch which descending through part of the Substance of the Brain to the *Glandula Pinealis*, terminates in the *Torcular Herophili*, which is form'd out of the Concourse of this and the Lateral *Sinuses*. This *Sinus* is much less than the rest. Besides these *Sinuses*, there are divers others on the Basis of the Skull, on the *Ossa Petrosa*, and round the *Sella Turcica*, which are constant and uniform in most Bodies: Though Nature sports as well in these as in the Veins of other parts of the Body, which therefore scarce deserve our pains to be very particular in.

Torcular
Herophi-
li.

Sinuses
whence
form'd.

All these *Sinuses* are form'd out of the several Venous Branches, which return the Blood from the Brain and *Cerebellum*, and deliver their Contents into the Jugular Veins, of which they are, as it were, the Roots from whence they spring.

The Coats of these *Sinuses*, (especially about *Motion.* the Divarication) are furnish'd with many strong Fibres seemingly Nervous, by means of which, as they are dilated by the Influx of the irruent Blood, so they are contracted again, and by their alternative Dilatation and Contraction, create a reciprocal Motion, like the Pulse of an Artery.

Immediately under this Membrane, lies another very fine, transparent one, from its extream Thinness and Fineness compared to a Spider's Web, and call'd *Arachnoides*, which between the *Dura* and *Pia Mater*, covers the whole Substance of the Brain. But this ought to be look'd on no otherwise than the External *Lamina* of the *Pia Mater*, which sends its Internal *Lamella* between the Folds of the Cortical part of the Brain. Arachnoides, the Exterior Lamina of the Pia Mater.

Under this, immediately upon the Brain, lies the *Meninx Tenuis*, or *Pia Mater*, which is also a thin, fine Membrane, adhering so closely, and insinuating it self into all the Folds of the Cortical part of the Brain, that it is scarce to be separated from it. This Membrane covers the whole Brain, *Cerebellum*, and *Medulla Oblongata*, and serves (together with the before-mentioned) for the Defence of the Brain, and support of its Vessels. Pia Mater. Fig. iii.

C H A P. III.

Of the BRAIN.

THE BRAIN (in the vulgar Acceptation) *Brain.* comprehends the whole Contents of the Skull, but in the Sense of Anatomists, is restrained to that large Globous Part, which fills *Division,* only the fore and upper part of it; the hinder
T
part

part being possess'd by the *Cerebellum*, and the under by the *Medulla Oblongata*.

Hemi-
spheres
of the
Brain.

The Brain (strictly so call'd) is divided by the Duplicature of its Membranes into two equal parts, commonly call'd *Hemispheres*, though the Brain itself in this restrain'd Acceptation, be far enough from an exact Spherical Figure.

Substance.
Cortical.

The Brain consists of two sorts of Substances, one of a Cineritious or Ash Colour, which being the exterior, is call'd the Cortical Part, which *Malpighius* by his Microscopes has discover'd to consist of innumerable minute Glands, of various Sizes and Figures, intermixt with abundance of excessive fine Blood-Vessels. This Part, by means of the Fissures and Sinuosities of the Brain, seems to enter deep into the Substance, though in reality it does not so, and reaches but the Depth of half an Inch or thereabouts, unless where the *Anfractus* or Discontinuations seem to let it in.

And Me-
dullary.

The inner part, which is more soft, and very white, is call'd the *Medulla*, and is suppos'd to consist of infinitely fine, soft Tubes, which receive from the Cortical, or Glandulous Part, the Fluid, which it separates, and by means of the Nerves, (which are only Productions of this Part) distributes it all over the Body.

Corpus
Callosum.

As soon as the Membranes are remov'd (which is no easy Task upon the Account of the strict Adhesion of the *Pia Mater*, which is scarce separable till the Brain begins to putrify, unless it happens to be a sort of an Hydropical Brain, abounding with Serous Humours): Between the *Hemispheres* of the Brain, under the *Sinus Longitudinalis*, appears a white Substance of a Texture, somewhat more compact than the rest of the Medullary part of the Brain, call'd therefore *Corpus Callosum*, which runs along the whole Tract of the *Falx*, and receives from each side the

the Terminations of the *Medulla*, which is interspers'd between the several Windings or Convolutions of the Cortical Part, and is suppos'd to be a sort of *Basis* or Support to it.

At the Extremity, next the *Cerebellum*, it sends ^{Fornix} out two Processes, or Legs, by the Juncture of which is constituted that Body which is call'd the *Fornix* or Arch.

Underneath this *Fornix* is found a thin transparent Substance, differing from the *Fornix* or *Corpus Callosum* itself, only in its Tenuity and Diaphaneity. From the *Fornix* it is continued all along under the *Corpus Callosum*, dividing the two great Cavities, or Lateral Ventricles of the Brain from each other. This Body is call'd the *Septum Lucidum*.

In each *Hemisphere* of the Brain is a pretty ^{Ventricles} large Cavity, which are call'd the Latetal Ven- ^{Four, La-} tricles. Besides which, just under the *Fornix*, ^{teral Two.} as it were, between the Bifurcation of it, is another Cavity, call'd the *Rima*, which though ^{Rima.} abundantly less than either of the other, is reckoned as a third Ventricle. And between the *Cerebellum* and the *Medulla Oblongata*, is a Fourth ; which are call'd the Four Ventricles of ^{Fourth} the Brain. ^{Ventricle.}

In the Lateral Ventricles on each side, appear ^{Corpora} the *Corpora Striata*, and the *Alæ* of the *Plexus Striata*. *Choroidalis*, which belonging to the *Medulla Oblongata*, and the Blood-Vessels, shall be describ'd in their proper places.

T A B. XV.

SHews the Basis of the Brain, and part of the *Medulla Oblongata*, with the Blood-Vessels injected with Wax.

A A, The fore Lobes of the Brain.

BB, The hinder Lobes.

CC, The *Cerebellum*.

DD, The Lateral Sinus's.

T 2

EE, The

EE, The Vertebral Arteries, as they run between the first *Vertebra* and Bone of the *Occiput*.

F, The *Vertebral Sinus*.

GG, The *Dura Mater*, on the right side, taken off from the Spinal Marrow, but remaining on the left.

I, 2, 3, 4, &c. Ten Pair of Nerves belonging to the Brain, and the first Seven of the Spinal Marrow.

a, The *Foramen* opening from the *Infundibulum* into the Pituitary Gland.

bb, The two white Protuberances behind the *Infundibulum*.

cc, Two Trunks of the Carotid Arteries, cut off where they began to run betwixt the fore and hinder Lobes of the Brain.

dd, Two Arteries joining the Carotids, with the Cervical Artery, call'd the Communicant Branches.

ee, Two other large Branches of the Cervical Artery, which help to make up the *Plexus Choroides*.

f, Branches of the Carotid Artery.

g, The Cervical Artery, compos'd of the Two Trunks, hh, of the Vertebral Arteries, which here runs along the Annular Protuberance somewhat con-

torted, as in other Subjects straight, and others yet more contorted.

hh, Two Trunks of the Cervical Arteries, lying on the *Medulla Oblongata*.

i, The Spinal Artery.

kk, The Spinal accessory Nerve.

ll The *Crura* of the *Medulla Oblongata*.

mm, The Annular Protuberance or *Pons Varolii*.

n, That part of the *Caudex Medullaris* on the right side, call'd by *Willis* and *Vieussens*, *Corpora Pyramidalia*.

o, That part on the same side call'd *Corpus Olivare*.

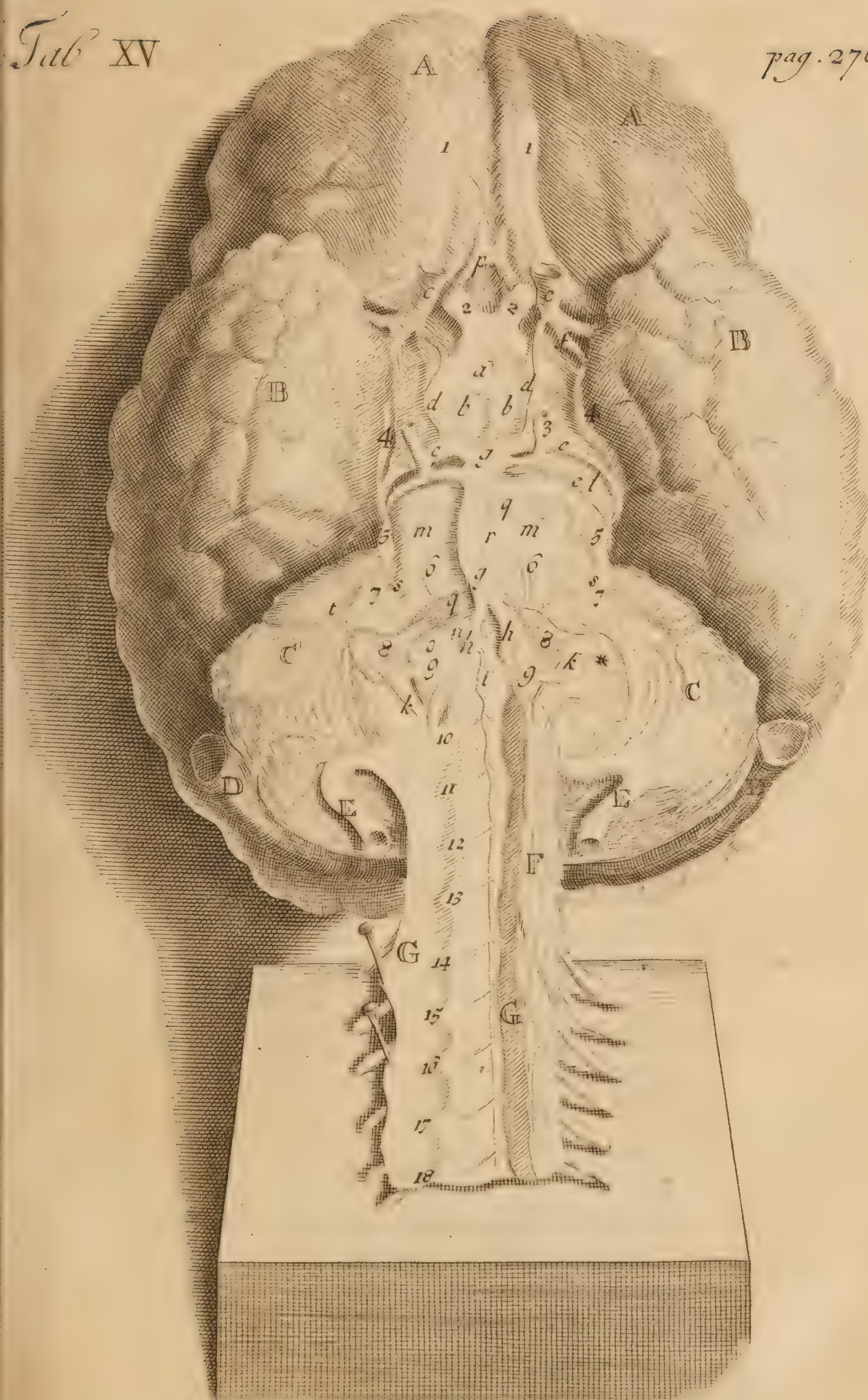
p, The fore-branch of the Carotid Artery, which divides the Anterior Lobes of the Brain.

qq, Other little Branches of Arteries, which help to constitute the *Plexus Choroides*.

rrr, Branches of Arteries from the Cervical Artery, dispers'd through the Annular Protuberance.

ss, Part of the Second Process or Peduncle of the *Cerebellum*.

*, A small Branch of an Artery, passing between the *Fibrillæ* of the Ninth Pair of Nerves.



C H A P. IV.

*Of the MEDULLA OBLONGATA, its Nerves,
Blood-Vessels, and other Appendices.*

THE MEDULLA OBLONGATA is the *Me-* Medulla
dullary part of the *Cerebrum* and *Cerebellum*. Oblonga-
ta.
The fore-part of it from the Brain, the hinder
from the *Cerebellum*. It lies upon the Basis of
the Skull, and is continu'd thro' the great Per-
foration of it into the hollow of the *Vertebra* of
the Neck, Back, and Loins. But, after its *Exit*
from the Skull, it is call'd by another Name,
viz. Medulla Spinalis.

It arises, as it were, from four Roots, of which *Crura*.
the two largest spring from the Brain, and are
call'd *CRURA*: The two lesser from the *Cerebel-*
lum, which have been nam'd *PEDUNCULI* by *Pedunculi*.
Dr. Willis.

The Substance of the *Medulla Oblongata*, seems *Substance*.
to be purely nervous, and to be only an Aggre-
gate of those small fine Tubes, thro' which the
Spirits are suppos'd to pass.

To examine this part of the Brain regularly, *Protube-*
it ought to be inverted; and then first appears *rantia An-*
upon the Trunk of it a Protuberance, in form *nularis.*
almost like a Ring, which has therefore been
call'd, by *Dr. Willis*, *Protuberantia Annularis.*

But in the taking the Brain out of the Skull, *Nerves,*
the ten Pair of Nerves, which come immediate- *ten Pair.*
ly from the Brain, are best shewn. For by first
raising the fore-part of the Brain, just below the
Os Frontis, the *OLFACTORY NERVES* come in *Olfactory*.
view, which being pretty thick near the *Os Cri-*
brosum, are there call'd *Processus Papillares*,
which is (in my Opinion) a properer Name than
that of Olfactory Nerves, in that Place; because
they seem rather to be Productions of the *Me-*

dulla Oblongata, from which the Olfactory Nerves arise, than distinct Nerves, against which their manifest Cavities, and their Communication with the Ventracles, argue.

Branches
of the Ca-
rotid Ar-
teries.

Immediately behind these Nerves appear two small Arteries, which are Branches of the *Carotides*.

Optick
Nerves.

The next Pair are the OPTICKS, which, arising from the *Crura* of the *Medulla Oblongata* on each side, come together, above the *Infundibulum*; and after parting again, go each of them to the Eye, on the respective side from whence they spring. This Concurrence has laid the Foundation of an Error, (in some Anatomists) that they decussate one another, and that each of them serves the Eye of the side opposite to that from which they have their Original.

Do not de-
cussate each
other.

Infundi-
bulum.

The Optick Nerves being cut off, the INFUNDIBULUM appears just under them, which ends in the *Glandula Pituitaria*, and on each side of it the Carotid Arteries enter the Skull, thro' the *Os Cuneiforme*.

Oculo-
rum Mo-
torii.

Next to these are the OCULORUM MOTORII, which shooting out of the *Basis* of the *Medulla Oblongata*, behind the *Infundibulum*, proceed forward to the Eyes.

Pathetici.

The fourth Pair, which are very small, are by *Willis* call'd PATHETICI, by others *Amatorii*. These have their Roots in the upper part of the *Medulla Oblongata*, near the *Cerebellum*, and pass thro' the same Perforations with the former Pair to the Eyes.

The fifth
Pair.

The fifth Pair, which is the largest of any that come directly from the Brain, consists of a Coalescence of divers small Nerves, which spring from each side, from the fore-part of the *Processus Annularis*, and is again, before its *Exit* from the Skull, divided into two or three Branches, which

which go out of the Skull at several Perforations.

The sixth Pair arises likewise from, or near the *Processus Annularis*, on the hinder-part, where the *Processus* seems not to be absolutely continu'd, and therefore it may be accounted to arise from the *Medulla*. It passes out of the Skull, thro' the same Holes with the *Oculorum Motorii*. Both these Pair, because they send some Branches to the Tongue, are call'd *Gustatorii*.

Gustatorii.

The seventh Pair are the AUDITORY, which arise from the *Medulla Oblongata*, near the Place where the *Processus Annularis* should be, if it were entire. It passes out of the Skull thro' the Perforations of the *Os Petrosum* in two Processes: One of which is soft and spongy, which goes to the Labyrinth and *Tympanum* of the Ear; the other, which is more compact and hard, to the Tongue, and other Parts of the Face.

The seventh Pair, or Auditorii.

The eighth Pair, or PAR VAGUM, arise laterally from the *Medulla Oblongata*, a little below the former, and pass out of the Head between the *Os Occipitis* and *Petrosum*, thro' the same Perforations that the *Sinus Laterales* of the *Dura Mater*, or Branches of the Jugulars do. It is join'd by a Branch of the accessory Nerve from the *Medulla Spinalis*, and by a Twig of the hard part of the Auditory.

The eighth Pair, or Par Vagum.

The ninth Pair arise from the middle part of the *Centrum Ovale*, between the *Corpora Pyramidalia* and *Olivaria* of the *Medulla Oblongata* by three or four small Twigs, and go out of the Skull near the *Processus* of the *Os Occipitis*; and send their Branches to the Tongue, as well to the Papillary as Muscular part of it, and likewise to all the Muscles that serve for the Motion of the Tongue: From whence these Nerves have been call'd *Linguae Motorii*, tho' they cannot justly be excluded from the Name of *Gustatorii* likewise,

The ninth Pair.

as they concur in that Office with the Branches of the fifth and sixth Pair.

The tenth Pair.

The tenth, which is the last Pair, (even with those that will allow it to belong to the Brain) arises by two or three Branches from the *Medulla Oblongata*, just below the *Corpora Pyramidalia* and *Olivaria*, or rather at the beginning of the *Medulla Spinalis*; from whence reflecting a little backwards it goes out of the Skull, between the first *Vertebra* of the Neck, and the *Processus* of the *Os Occipitis* of the same Orifice; through which the Vertebral Arteries enter, and is spent upon the external Muscles of the Head and Ears.

Authors have differ'd about the Number of Nerves that have their Rise within the Skull, and this latter Pair is yet by many excluded from that Number. But this is a Controversy of no great Importance. Their Difference, about the Distribution of them, is more material. Of that we shall have occasion to speak more largely hereafter.

Lateral Ventricles of the Brain, how to be examin'd.

The Brain being clear'd from the Skull, and the Original and Passage of the Nerves regularly trac'd; it will be proper to lay the Brain upon the *Basis*, and return to the Lateral Ventricles: In which we shall find two Prominences on each side, one Pair call'd *Corpora Striata*, being the Extremities of the *Crura* of the *Medulla Oblongata*, the other *Thalami Nervorum Opticorum*.

Corpora Striata.

THE CORPORA STRIATA, are a Medullary part call'd *Striata*, only from the visible Appearance of nervous Fibres, immediately upon the Abrasion of the Membrane, and Surface of them.

Situation.

They lie in the fore-part of the Ventricle, and are of a Lenticular Figure, somewhat bigger, and approaching to each other at the fore-end, than the hinder, which point laterally, and are not only narrower but farther distanc'd from one another. They

are

are join'd together by the transverse Medullary Proceſs. The external Substance of them is Cortical or Glandulous, as the superficial part of the rest of the Brain is, tho' it be not here so deep. The inward is that strip'd Medullary part from whence they take their Name, which upon scraping is very plain.

Betwixt these two is that Medullary Body which is call'd the FORNIX, which is a broad thin Production of the *Medulla*. *Substance of the Fornix.*

A little below these *Corpora Striata* lie two other Prominences, call'd THALAMI NERVORUM OPTICORUM, because the Optick Nerves have their Rise from them. These, contrary to the former, have their external part or Surface next the Ventricle, Medullary; and their inner Cineritious or Cortical. *Thalami Nervorum Opticorum.*

On either side of these Protuberances is to be seen a small *Plexus* of Blood-Vessels, call'd PLEXUS CHOROIDES; consisting of a great many minute Ramifications of the Veins and Arteries, with small Glands interspers'd, among which some pretend to find Lymphaticks; the Existence of which is much easier from Reason to be imagin'd, than to be demonstrated to sight. *Plexus Choroides.*

Underneath the *Fornix* is a small Cavity, opening with a very narrow Aperture, call'd the RIMA, into the *Infundibulum*. This, as we have already observ'd, is call'd the third Ventricle of the Brain. *Rima.*

At the bottom of this Cavity, just below the Coalition of the Optic Nerves, lies the INFUNDIBULUM, which seems to be nothing else but a Passage continued from this third Ventricle to the *Glandula Pituitaria*, between the Medullary Parts of the Brain, and lin'd with the *Pia Mater*; and therefore not so properly to be look'd upon as a Vessel, but as an out-let for Serosities; though this *Glandula Pituitaria*, to which it is continu'd, seems *Infundibulum.*

seems no proper Drain for 'em, however it may have been esteem'd hitherto.

Glandula
Pituitaria.

Its Use not
certain.

Not to re-
ceive Hu-
mours al-
ready se-
parated.

This Gland
larger in
Brutes
than in
Men.
Has two
Coats.

Rete Mi-
rabile.

Underneath the *Infundibulum*, in that *Sinus* of the Skull which is call'd *Sella Equina*, or *Turcica*, upon the *Os Cribrosum*, is situate the GLANDULA PITUITARIA; so call'd from its suppos'd Office of receiving and discharging the ferous Humours evacuated by the Ventricles of the Brain. But tho' the Use of this Part, as of divers others about the Brain, does not plainly and distinctly appear to me; yet I cannot admit of this Use, both because it is against the Office of a Gland to receive Humours already secreted, which a Vessel of a more simple Structure might more readily and easily perform; and because it is the peculiar Office of Glands to separate Humours before unsecreted; which two Uses imply a direct Repugnance not to be reconcil'd. But besides the Structure of this Gland, which is firmer than any other of the Body, makes it absurd to think that it should, like a Sponge, suck up Humours, not only in Contravention to its own Use as a Gland; but likewise in violence to its own Structure, which is more compact than that of other Glands, especially of those of the Brain. I do therefore imagine that it does, as other Glands, serve to secrete some Humour or other, tho' to what purpose is not so apparent. This Gland is very small in human Bodies, but in Brutes much larger; which difference may, at some time or other, suggest to a Man of happy Sagacity something concerning the true Use of it. It is cover'd with two Coats from the *Meninges* of the Brain.

Surrounding this Gland, in the *Sella Turcica*, is a small *Plexus* of Vessels, call'd RETE MIRABILE; which is either not existent in Men, or so very minute, that its Existence is fairly doubted. In Brutes it is conspicuous enough, and by

Willis

Willis is said to consist of Arteries, Veins, and Nerves; by *Vieußens*, of Arteries only; and by others, of Arteries and small Veins. This is a Controversy not easy to be decided, and scarce worth the trouble. All that appears certain is, that it consists mainly, if not wholly, of some Ramifications of the Carotid and Vertebral Arteries.

On the hinder part of the third Ventricle, or Cavity, is a small *Foramen*, or Hole, leading to the fourth Ventricle in the *Cerebellum*. This Cavity is call'd the ANUS.

At the Mouth, or Orifice of this Passage, is seated a small Gland, which, from its fancy'd resemblance in form to a Pine-Apple, has been call'd CONARIUM, or GLANDULA PINEALIS, which *Descartes*, and some of his Followers, have extravagantly enough imagin'd to be the Seat of the Soul.

Glandula
Pinealis.

On the back-side of the *Medulla Oblongata*, about the Stem of it, near the *Cerebellum*, appear four Protuberances or Eminencies, of which the upper Pair, which are the larger, are call'd NATES; the under and lesser, TESTES. The Substance of both these is Medullary. The latter are over and above cover'd with a *Plexus* of Blood-Vessels.

Nates &
Testes.

Betwixt these and the Processes of the *Cerebellum*, to which they are joyn'd on the sides, is a Cavity making a hollow in the middle, which is the fourth Ventricle, and has from its Figure been call'd CALAMUS SCRIPTORIUS.

Calamus
Scripto-
rius.

Besides those before mentioned on the *Medulla Oblongata*, near the Extremity of it, are four other Prominencies, two on each side, call'd CORPORA PYRAMIDALIA and OLIVARIA. The first situate in the middle of the *Basis* of the *Medulla*, just below the *Processus Annularis*, contiguous

Corpora
Pyrami-
dalia and
Olivaria.

to

to each other: The latter on each side of the former. These Names were given them from their suppos'd Resemblance.

C H A P. V.

Of the CEREBELLUM.

Cerebellum.

THE CEREBELLUM, (so call'd from its distinction from the Brain, both in Size and Situation) has been look'd upon as a little Brain by it self; and is placed in the hinder and lower part of the Skull, underneath the hinder part of the Brain.

Substance.

It consists, as the Brain does, of a CORTICAL and MEDULLARY Part; the several Branches of which latter, resemble, when open'd, those of a Tree, and meeting in the middle, form a kind of a Stem which runs quite through it.

Superficies.

Its Surface is unequal, but not so gyrous or winding as that of the Brain, but looks rather as if it were laminated like some sort of Shells; the middle Circles being the largest, and the deepest growing more plain by degrees, till it terminates at length on each side of the *Processus Vermiformis*, so call'd from its resemblance of a Worm.

Processus Vermiformis.

As in the Convolution of the Brain, a Duplication of the *Pia Mater* is insinuated betwixt each of them; so 'tis here likewise between the *Laminæ*, tho' not, by much, so deep, as in the Brain.

Pedunculi.

The *Cerebellum* is joyn'd to the *Medulla Oblongata*, by two Medullary Processes, nam'd by *Willis Pedunculi*, in which he observ'd three distinct Processes on each side. The two first of which go on each side to the *Testes* before describ'd, and betwixt them runs a Medullary Substance covering the upper part of the *Anus*, call'd *Valvula Major*.

Major. The second goes directly from the *Cerebellum* to the *Medulla Oblongata*, decussating the former, and forms the *Processus Annularis*. The third springing from the hinder part of the *Cerebellum*, is inserted into the *Medulla Oblongata*, looking like an additional Chord to it.

Besides these, there are observ'd two or three other Medullary Processes, which passing a-cross the *Medulla Oblongata*, make that Arch, which from the Discoverer is call'd *Pons Varolii*.

All the afore-mentioned Parts of the Brain, and *Cerebellum*, are furnish'd with Blood by two Pair of Arteries, which are the Carotids and the Vertebrals.

The first of these enters the Skull, thro' the Perforations of the *Os Sphænoides*, on each side of the *Sella Equina*; and immediately sends out some Branches to the *Glandula Pituitaria*, lying within that Cavity; which Branches, in most sorts of Brutes, are more large and numerous than in Men; and being complicated with correspondent Veins, make that conspicuous *Plexus* of Vessels, which in them is call'd the *Rete Mirabile*; but in Men is so inconsiderable, as generally, tho' not truly, to be thought wanting. After this, these Arteries piercing the *Dura Mater*, are divided into three principal Branches, which are call'd the Anterior, Lateral, and Posterior. The Anterior, of each side, coming to a Conjunction near the Coalition of the Optick Nerves, send off two pretty fair Branches to the *Os Cribrosum*. The Lateral running a-cross the two *Hemispheres* of the Brain, make a kind of Section of it, into the fore and hinder part. The Posterior, meeting behind the *Infundibulum*, sending off the two larger Twigs, on each side proceed in a single Trunk to the *Protuberantia Annularis*, where that Trunk joyns with the Vertebral Arteries.

Pons Varolii.

Vessels of the Cerebrum and Cerebellum.

Carotids.

Rete Mirabile.

Tripartite Division of the Carotids.

*Vertebral
Arteries.*

These enter the Skull through the great *Foramen* of the *Os Occipitis*, creeping up along the sides of the *Medulla Oblongata*, under the *Basis* of which they proceed severally to the afore-mentioned Conjunction, where they meet and join with the single Trunk of the *Carotids*.

Veins.

The lesser Ramifications of these Arteries are dispers'd through all the Substance of the Brain, *Medulla Oblongata* and *Cerebellum*; where they meet with abundance of small Veins, which do not come together in any Trunk, till they arrive at the several *Sinuses* of the *Dura Mater*, from whence the Blood is return'd to the Heart by the Jugulars.

*Bidloo's
Error con-
cerning
the Veins.*

* Bidloo's
Guliel-
mus.
Cowper
Citatus,
&c.

The want of a considerable Venous Trunk in any part of the Brain, *Medulla*, and *Cerebellum*, has occasion'd some Anatomists, particularly * Mr. Professor Bidloo, to assert that there were no Veins in the Brain; an Error which he has stiffly maintain'd in his Epistle or Citation of Mr. Cowper before the Royal Society; altho' the Veins, which empty themselves into the *Sinuses*, be not only numerous but conspicuous enough, and pretty fairly delineated in the Anatomical Figures publish'd by him, but not taken notice of in his Explication.

*Distribu-
tion of the
Arteries in
the Brain.*

The numerous minute Ramifications of these Arteries are scarce to be discover'd in a general Dissection of the Brain. But if the *Carotids* and *Vertebrals* be injected with Wax, they shew a very elegant Distribution thro' the whole Substance of all these Parts, as is express'd in *Tab. XV. EE, cc, dd, ee, f, g, h, i, *, p, q, r, &c.* as also in the Scheme of all the large Trunks of the Arteries of the whole Body, hereafter to be met with.

C H A P. VI.

Of the MEDULLA SPINALIS.

THE *Medulla Spinalis*, or Spinal Marrow, *Medulla* is little more than a Production of the *Me- Spinalis.* *dulla Oblongata*, or Medullary Part of the Brain. It consists as the Brain does of two parts, a White or Medullary, and Cineritious or Glandulous; but with the Position inverted. For whereas in the Brain the Cineritious Part is the Exterior every where (except in part of the *Basis* in the Spinal Marrow) it is surrounded with the White Part, by which contrivance any unnecessary Reflexion of the Nerves is avoided, and they go immediately out from the Medullary Part, which they cou'd not have done, had the Cineritious been external as in the Brain.

As soon as it falls out of the Skull thro' the great Hole of the Occipital Bone, it takes the Name of *Spinalis* instead of *Oblongata*.

The Substance of the exterior part is much the *Substance.* same with that of the *Corpus Callosum*, only somewhat more tough, and more distinctly fibrous; which difference the lower it descends is gradually more apparent. The reason of which difference is the straitness of the Cavity, which growing gradually more narrow presses the Medullary Fibres closer together, and renders them more compact, and gathers them into more distinct *Fasciculi*; till having descended through the whole Tract of the Spine, they end at last in the *Cauda Equina*.

Out of the *Medulla Spinalis* springs Thirty *Spinal* Pair of Nerves, which are nothing but Fascicles *Nerves.* of Medullary Fibres cover'd with their proper *Tab. xv.* Membranes.

Coats.

The Coats of it some reckon to be Four. The first or Exterior of which is a strong Nervous Membrane, and serves as a Ligament to tie the *Vertebræ* together to the inside of which it firmly adheres ; and therefore is not so properly reckoned among the Coats of the *Medulla*. This generally appears moist with a viscous Humour, and in Fat People is furnish'd with an oily Fat about the Junctures of the *Vertebræ*.

Second
or First
proper.

The Second, or rather First proper Coat is a Production of the *Dura Mater*, which embracing the *Medulla* loosely on the hinder-part, takes firmer hold on it on each side at the egress of the Nerves. This Membrane, immediately upon its Exit from the Skull, where it adheres to the Margin of the great *Foramen*, grows so thick and strong, and is furnish'd with so many fleshy Fibres, that it seems externally according to *Vieussen*, to resemble a thick Ligament ; and even on the inside to appear both for Colour and Substance like a strong fleshy Membrane. Towards the fore-part it is loosely connected to the common Integument or inward Vertebral Membrane before describ'd. In its Progress downwards, especially after it has pass'd the Vertebral of the Neck, it grows more thin and subtle.

This Membrane serves to defend the Spinal Marrow from any hurt from the Flexures of the *Vertebræ*, especially in the Neck ; the *Vertebræ* of which are subject to a more frequent, and greater variety of Motions and Contortions ; for which reason it is stronger there than elsewhere. It seems likewise to defend the Spinal Marrow from receiving any Injury on the hinder-part by Cold, to which on the fore-part it is not expos'd, and therefore does not so much want this Covering ; and lastly, it is suppos'd by compressing the Body of the Spinal Marrow, to promote the Expulsion of whatever is secreted there.

The

The Third, or Second proper Coat, is a Pro-
 duction of the *Membrana Arachnoides*, and is a
 thin Pellucid Membrane lying between the *Du-
 ra* and *Pia Mater*, or the First and Third proper
 Membranes of the *Medulla*, to the latter of which,
 it adheres so closely on the fore-part and sides,
 that it is hardly separable from it, but easily e-
 nough on the hinder-part. This Membrane
 gives a Coat to the Nerves that go out of the
 Spine, which is the inner common Membrane of
 the Nerves, as that which comes from the *Dura
 Mater* gives the outer.

The Fourth and last Coat, or Third proper,
 is a continuation of the *Pia Mater*, and is an ex-
 cessive Fine Transparent Membrane, strictly em-
 bracing the whole Substance of the *Medulla*,
 dividing it in the middle through the whole
 Tract, and making, as it were, two Columns
 of it.

The Vertebral Arteries in their ascent to the
 Brain, send off on each side, a Twig to every
 Juncture of the *Vertebræ* of the Neck ; and after
 their joyning at the *Protuberantia Annularis*, send
 back again a Branch which running along the
 Spinal Marrow is call'd the Spinal Artery, and
 join'd at every *Vertebra* above the Heart, by
 those Twigs already mention'd. Below the Heart
 the *Aorta* sends Branches to every Joint of the
Vertebræ. All these piercing the Substance of
 the *Medulla*, and sending some Twigs to the
 Arterial Trunk, lose the rest in the *Caudex Me-
 dullaris*.

The Blood is return'd by minute Ramifications
 of Veins into two Channels, which accompany
 the Spinal Marrow on each side through the
 whole Tract, and are call'd *Sinus Venosi*, which
 send out their Branches in the Parts between the
 Head and the *Thorax* to the Cervical Veins ; in

the *Thorax* to the *Vena Sine Pari*, and below where the Trunk of the *Vena Cava* lies upon the Spine, immediately to the *Cava* it self.

T A B. XVI.

F I G. I.

THE Annular Protuberance, and *Medulla Spinalis*, &c. cut thro' the middle, lengthways.

A A, The *Crura Medullæ Oblongatæ*.

B B, The Annular Protuberance, or *Pons Varolii* divided.

c c, Its Transverse *Stria*.

e e, Its middle Medullary Tract, in which the *Striæ*

terminate on each side.

f f, The Third, or Chordal Processes of Dr. *Willis*.

h, The Spinal Marrow.

i i, Part of the *Cerebellum*.

k k, The Second Processes of the *Cerebellum*, which compose the Annular Protuberance.

l l, The Cineritious part of the *Medulla Oblongata*.

F I G. II.

THE *Cerebellum* cut through on its hinder-part, and reclin'd laterally.

A A, The *Cerebellum*.

B B, The Arborious Ramifications of the *Medullium* of the *Cerebellum* appearing in this Section.

C C, The Pathetick Nerves at their Origins.

c c, The *Nates*.

d d, The *Testes*.

e, The Transverse Processes where the Pathetick Nerves have their Original.

f, The *Glandula Pinealis*.

g g, The first Process of the *Cerebellum*, running from it to the *Nates* here extended laterally.

h h, The Third, or Chor-

dal Processes.

i i, The Transverse Medullary Process in the Fourth Ventricle, where the soft Branch of the Seventh Pair of Nerves has its Original.

k k, The Medullary Process behind the *Testes* down to the other afore-mention'd Medullary Transverse Process.

l l, The Originals of the Processes.

m m, The Eighth Pair of Nerves.

n, The *Calamus Scriptorius*, or Extremity of the Fourth Ventricle.

o, The Spinal Marrow.

p p, The Accessory Nerves.

q q, The Tenth Pair of Nerves.

C H A P.

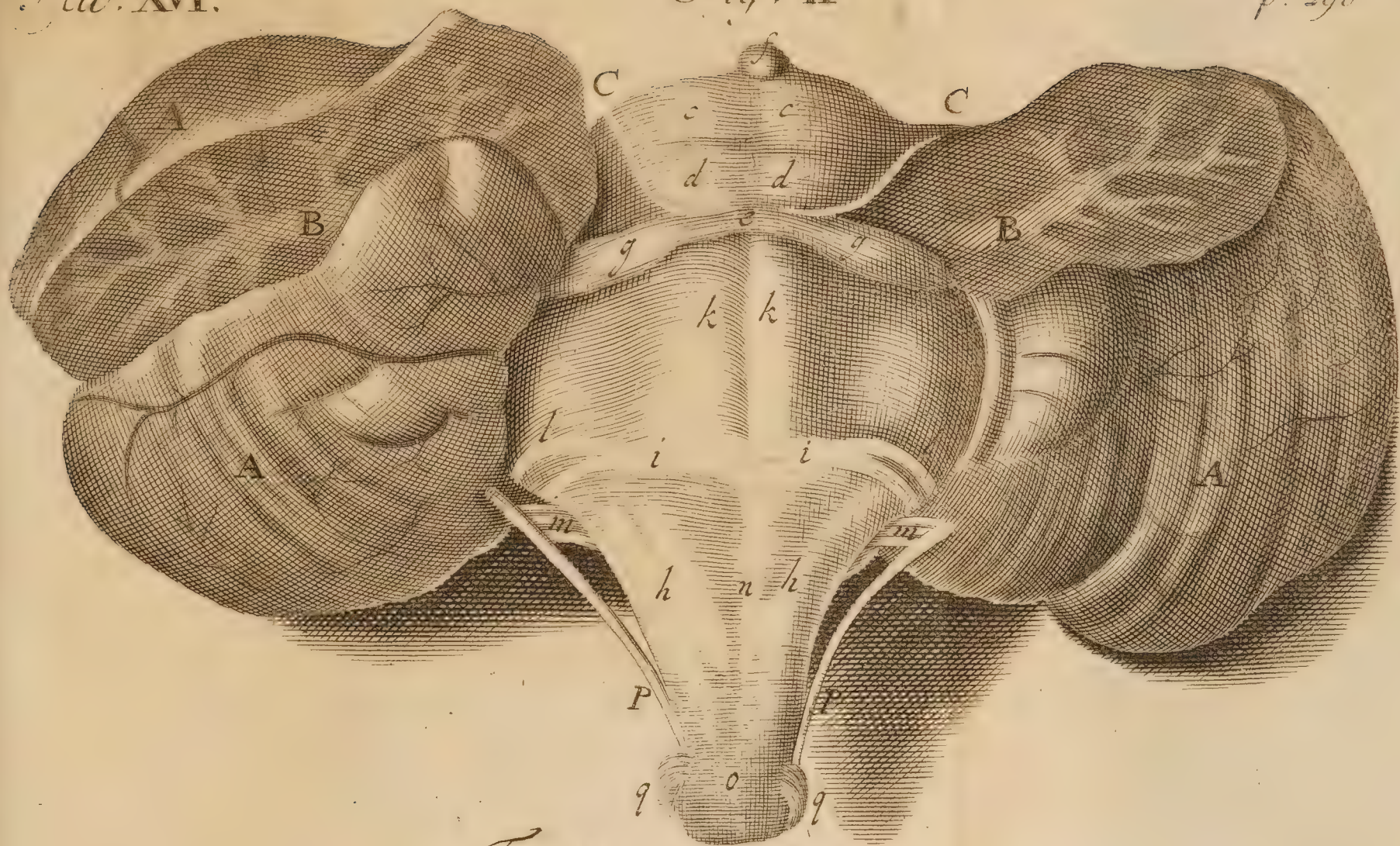
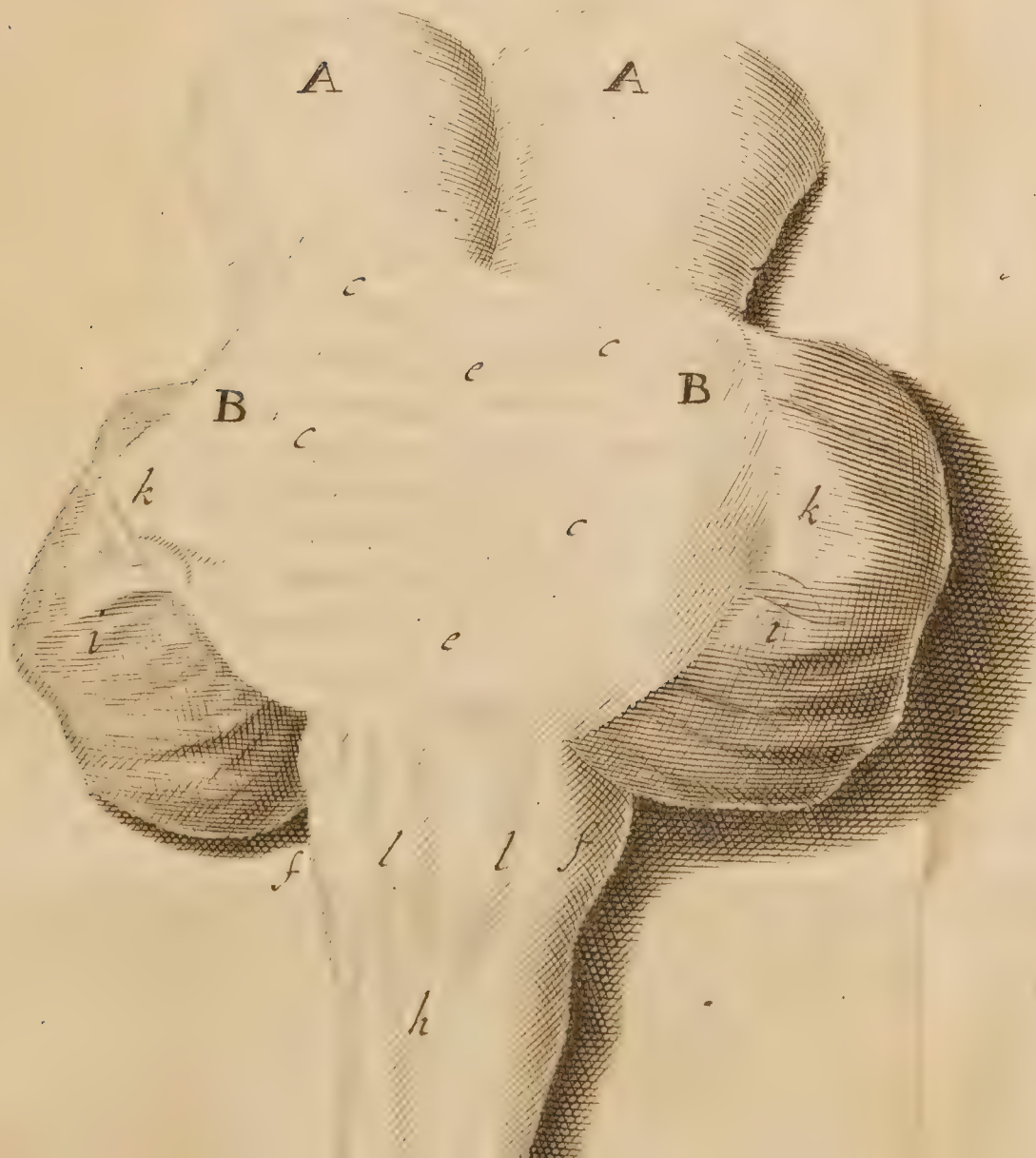


Fig: I.





C H A P. VII.

Of the NERVES which have their Origine within
the SKULL.

THE Nerves being the Offspring of the Brain, *Cerebellum*, *Medulla Oblongata*, and *Spinalis*, the account of them seems naturally to follow the preceding.

They are, as has been already observed, in Number Ten Pair, which arise within the Skull. *Ten Pair of Nerves.*

The First Pair is the Olfactory, whose appearance within the Skull, and Exit, have already been describ'd. These, as soon as they have made their way through the *Os Cribrosum*, are distributed in the Membranes of the Nose only, which in Men being short and situate upon the *Os Cribrosum*, there is not much to be seen of it. Its use is for the Sense of Smelling. *First Pair. Tab. xv. N. 1.*

The Optick Nerves, which are the next Pair, have almost as short a progress, being wholly spent upon the Tunicks of the Eye, of which the *Retina*, so call'd from its Resemblance of Network, is an Expansion of the inner or Medullary part of it only; and upon this the Impression of the Objects of Vision is suppos'd to be made. These Nerves pass out of the Skull through two Perforations in the Basis of the Skull, a little above the *Sella Equina*, near the fore-internal Processes of the *Os Sphenoides*, which lead directly to the Orbits of the Eyes. About the Trunk of these Nerves some Branches of the Third and Fifth Pair twine themselves, sending, probably, some Fibres to the Coats of it in their Process to the Tunicks of the Eye. *Optick Nerves. Ib. 2.*

The Third Pair are call'd *Oculorum Motorii*. These arise from the *Crura* of the *Medulla Oblongata*. *Oculorum Motorii. Ib. 3.*

App.
Tab. xv.
Fig. vi.

gata, near the Annular Protuberance: Whence they march out between two Branches of the Cervical Artery, and passing out of the Skull at an irregular oblong hole, immediately underneath the former, are spent upon those Muscles of the Eye which are call'd Attollent, Depriment, Adducent and *Obliquus Inferior*; except some small Fibres which go into the Muscle of the upper *Palpebra*.

Pathetici.
Tab. xv.
Nº 4.

The Fourth Pair is the Pathetick, which rises behind the *Testes*, and passes out of the Skull at the same *Foramen* with the former Pair, and spends it self wholly upon the Trochlear Muscle.

The two first Pair of these Nerves serve only for Sense. The first for Smelling, the latter for Sight; the two latter serve for both Sense and Motion.

Fifth
Pair. Ib. 5.

The Fifth Pair, which is the largest of all those that come from the Brain, has its use as well as distribution more extended, serving both for Sense and Motion, for Touch and Taste. It sends Branches not only to the Eyes, Nose, Palate, Tongue, Teeth, and almost all other parts of the Mouth and Face: But likewise into the Breast and lower Venter, by means of the Intercostals, which are partly compos'd of Branches of this Nerve.

Rise.

It arises from the side of the *Protuberantia Annularis* near the *Processus Cerebelli*. It is at its Origine very large, but before its Egress from the *Dura Mater*, it is apparently divided into two Branches, consisting each of 'em of innumerable nervous Fibres, or Bundles of little Nerves, of which those of one Branch are pretty tough and firm, the other soft and lax, and therefore it is divided into a hard and soft Branch. It is cloath'd with a Coat from the *Dura Mater*, and a little beyond the *Os Petrosum*, on each side of the

the *Sella Equina* forms a *Plexus*, which is call'd *Ganglioformis*, which receives small Branches of Arteries from the Cervicals, and sends both correspondent Veins to the Lateral *Sinuses*.

Near the *Plexus Ganglioformis*, each of these *Division* Nerves is divided into an Anterior and Posterior Branch.

The Anterior or fore-Branch, after having sent some Twigs into the *Dura Mater* is cover'd with a pretty thick Membrane, and enters the Receptacle on each side of the *Sella Equina*, where it sends off sometimes one, and sometimes two Twigs, which together with a Twig of the Sixth Pair sent off there likewise, end in the Intercoastal Nerve; and as soon as it emerges from this Channel, it is again divided into three Branches pretty near equal.

The upper of these three Branches, which is somewhat the lesser, passing through the *Foramen Lacerum* to the Orbit of the Eye, is immediately sub-divided into three lesser Branches; of which the first having sent off a Twig to the *Tunica Adnata* of the Eye, to the *Glandula Lacrymalis*, to the Muscles that draw the Nose upwards, to the Eye-lids and their Orbicular Muscles, running over the Muscle, which draws up the upper Eye-lid, is spent on the Muscles of the Fore-head, and the common Integuments of the fore-part of the Head.

The Second Branch, running under the *Pacheticks* and *Motorii*, is again divided into two, of which the lesser and outward slip which regards the lesser *Cantbus* of the Eye, sends off several Fibrils into the Fat, which envelops the Optick Nerve; and joining with others from the Third Pair, form a little sort of *Plexus* upon the Trunk of the Optick Nerve it self, from whence the Fibrils proceeding through the Fat, which covers the hinder-part of the *Tunica Sclerotica*,

end some of them in the *Musculus Deprimens*, others in the *Adducens*, and the rest in the *Tunica Sclerotica* it self.

The inner, which is the bigger slip of the Second Branch, is again divided into four Twigs. The first running over the Optick Nerve, against the great *Canthus* of the Eye, enters the *Tunica Sclerotica*, and is spent in the Membrane. The second, returning into the Skull by a peculiar Perforation, pierces the *Crassa Meninx*, to which it probably gives some Twigs, as the difficulty of separating it from it seems to argue; and sometimes turning back again, passes out of the Skull through one of the holes of the *Cribriforme*, and is distributed into the Interior Membrane of the Nose. The third Twig goes towards the greater *Canthus* of the Eye, and is spent partly on the Eye-lids and their Orbicular Muscles, upon the External Integument of the Nose, and the Muscles which draw it upwards. The fourth is distributed by several Twigs into the Eye-lids and the Orbicular Muscles.

*Third
Branch.*

The third slip of this Superior Branch running under the Nerve of the Sixth Pair, and the Abducent Muscle, is spent on the *Glandula Innominata* and *Tunica Adnata*.

*Inferior
Branch.*

The lesser Inferior Branch, before it goes out of the Skull, enters the Orbit of the Eye, and running along the out-side of the *Musculus Abducens*, goes out again at a little Perforation peculiar to it; after which being divided into several Fibres, some of which go to the Integuments of the Cheeks, and the rest to the Muscles that raise the upper-Lip. As soon as this Branch goes out of the Skull at the third *Foramen*, it is again divided into three little Branches; of which the first, after having bestow'd some Twigs upon the *Musculus Masseter*, upon the Teguments of the Face, upon the Gums and
Teeth

Teeth of the upper-Jaw, enters a peculiar *Sinus* of the Bone, making the lower part of the Orbit of the Eye, and goes out at a hole particular to it; after which it is divided into several Fibrils which go to the Teguments of the Face, to the upper-Lip, to the Muscle which draws the lower-part of the Nose laterally, and to the inner Muscle of the Nose. The second small Branch running downwards behind the Ducts, which go from the Nose to the *Fauces*, is divided into two, of which the upper by many Twigs is distributed into the *Membrana Pituitaria*. The lower passing through a peculiar Hole on the hinder and lateral part of the Bone of the Palate, is distributed into that spongy Flesh, that lines the Palate, and the tough Membrane that covers it. The third little Branch is spent on that part of the *Membrana Pituitaria* which lines the *Fauces* upon the *Uvula*, and Muscles thereabouts, and upon the Tonsils.

The *Ramus Major* or *Posterior*, after having *Posterior*. bestow'd some Twigs upon the *Dura Mater*, receives a Coat from that, and the *Pia Mater* cloath'd, with which it passes out of the Skull through the Fifth *Foramen*, and having sent off some Twigs to the *Musculus Buccinator*, *Masseter*, and those of the lower Jaw, is divided into three considerable Branches.

The first of these being join'd by a Twig of the hard part of the Auditory Nerve from the Barrel of the Ear, goes to the Root of the Tongue; from whence proceeding forwards, it sends several Twigs to the Maxillar Glands. From the outer-side it sends likewise divers others, which, running along the inner Substance of the Tongue, end in Capillars at the extremity of it; and joining every where with the Branches of the Ninth Pair, serve both the Muscles, and the Papillary
 U 4 Glands,

Glands ; and therefore seem to contribute as well to the Taste as the Motion of the Tongue.

The second or middle Branch sending off first one Twig, which is distributed partly into the Maxillar Glands, and partly into the Muscles *Styloglossus* and *Myloglossus*, enters the *Sinus* or Hollow of the lower-Jaw, along which it runs, accompany'd with Branches of the Carotid Arteries and little Veins, which return to the Internal Jugulars ; and besides sending off a Twig to each Tooth, with the Membranes of the aforesaid Vessels, contributes towards forming a Membrane, which lines the whole *Sinus*. At the fourth *Molaris* or Grinder, it is divided into two Branches: The lesser of which runs on to the very Commissure, or joining of the Jaw. The bigger, passing out at a peculiar Perforation, is divided into several Fibres, which are dispos'd into the Muscles of the lower-Lip, and into the Chin.

The Third and exterior Ramifications of this greater and posterior Branch is spent upon the Parotid Glands.

*The Sixth
Pair.
Tab. xv.
Nº 6.*

The Sixth Pair of Nerves arises from the Medullary Tracts of the *Centrum Ovale*, just below the *Processus Annularis*, and proceeding forwards enters the same Receptacle or *Sinus* of the Skull, on the side of the *Sella Equina*, as the Fifth Pair does ; where sending off a Twig consisting sometimes of two, sometimes of three Fibres, which joining those of the Fifth Pair, before-mentioned, go to the Intercostals ; it goes out of the Skull at the same hole with the *Oculorum Motorii*, and ends in the Abducent Muscles of the Eye. Besides which it sends some small Twigs to the Tongue, and therefore is reckon'd among the Gustatory Nerves.

*Seventh
Pair, or
Auditory
Nerves.*

The Seventh Pair or Auditory Nerves, passes out of the Skull through a hole of the *Os Petrosus*, which is the Seventh Perforation. It
arises

arises from the Medullary Tract of the fourth Ventricle, and emerges behind the *Processus Annularis*, near the eighth Pair, with which the soft part of it joins. As soon as it is passed out of the Skull, it is divided into two Branches, a hard and a soft one, which immediately part; the hard entering a little *Sinus* in the upper part of the Bone, which constitutes the Barrel of the Ear, where it sends off a Twig, which turning towards the fore-part of the Skull, goes out of the *Os Petrosum*, and is distributed into the *Dura Mater*; except some small Twigs which go to the Membrane which lines the Barrel, to the internal Muscles of the Ear, and to the fine Membrane that cloaths the inside of the Cavity of the *Apo-physis Mamillaris*. After this the hard Branch sends off two other Twigs; one of which joins the Nerves of the eighth Pair, a little above its *Plexus Ganglioformis*; the others go to the *Tympanum*, of which it makes the Chord, and creeping over the handle of the *Malleolus* goes out of the Ear, and runs downward between the *Musculus Pterigoidæus Internus* and the Tongue; into which latter it sends a Ramification, which joins with a Twig of the posterior Branch of the fifth Pair, before describ'd.

Besides these, the hard Branch coming out of the *Processus Mamillaris*, sends some Twigs to the *Musculus Masseter*, and others to the Glands about the Ear; where being divided into two other Ramifications, the Interior of these having first bestow'd some Fibres upon the Glands themselves, turns off towards the Cheek; and is divided into several Fibrils, of which one, joining with another belonging to the fifth Pair, goes to the upper Lip. The rest are spent on the lower *Palpebra*, and upon the external part of the Face.

The exterior Ramification of this hard part, after having likewise bestow'd some Fibrils upon the Glands, out of which it issues, is divided into two other Ramifications; the upper of which is distributed into the *Musculus Quadratus* of the lower Jaw, and outer Parts and Muscles of the lower Lip. The lower Ramification is spent upon the Integuments of the fore and lateral Parts of the Neck, upon some Muscles of the lower Jaw, and upon the Muscle *Mastoides*.

The soft Branch of the seventh Pair is larger than the hard, altho' it seems to consist of fewer Fibres. It is divided into three Ramifications, of which the superior passes thro' a small *Foramen* peculiar to it into the *Concha* of the Ear; where it expands itself, and forms a very fine Membrane, which lines all the inner Surface of it. The second and third Ramifications go likewise to the inner part of the *Concha* and semicircular Ducts, which they furnish with Membranes that are the immediate Instruments and Organs of Hearing.

Par Vagum, or eighth Pair.
Tab. xv.
Nº. 8.

The eighth Pair, by the Antients esteem'd the sixth, is both by them and the Moderns call'd *Par Vagum*. These spring from the *Medulla Oblongata*, a little above the *Corpora Olivaria*, and pass out of the Skull through the same Perforations, with the Lateral Sinuses of the *Dura Mater*. Along with them, wrapp'd up in the same Coat from the *Dura Mater*, passes a pair of Nerves, which has its Origin from the *Medulla* contain'd in the *Vertebræ* of the Neck, and is call'd *Par Accessorium*; which soon after its return out of the Skull, leaves the *Par Vagum* again, and is distributed into the Muscles of the Neck and Shoulders. Besides, it is join'd by a Twig of the hard part of the seventh Pair, and at the second *Vertebra* of the Neck, by the Nerves that issue from the Cervical Marrow there,

Par Accessorium App.
Tab. xvi.

there, and sends forth several Twigs to the Muscles of the *Larynx*, *Gula*, Neck, and the Parts thereabouts; especially from a Ganglioform *Plexus*, form'd by its Union with a Branch of the *Intercoastal*. After this, descending along the Trunk of the *Aspera Arteria* to the *Thorax*, it makes another *Plexus* immediately under the Clavicle; from which *Plexus*, on the right side, the recurrent Nerve on that side has its Rise, tho' on the left it springs from the Trunk of the Nerve itself. The right recurrent is reflected at the Axillary Artery, and the left at the descending Branch of the *Aorta*; and both run up along the sides of the *Trachea*, to which they impart some Twigs, and end at last in the Muscles of the *Larynx*. These serve for the Formation and modulating of the Voice, as appears by a Dog's not being able to bark after they are cut.

*Plexus
Ganglio-
formis
superior.*

*Inferior.
Recur-
rents.*

Over against the Origine of the great Artery, it sends off a considerable Branch towards the Heart, which splitting it self presently into two, the lesser Branch twists about and embraces the Pulmonary Vein; the bigger joining with that of the opposite side goes to the *Pericardium*, and the Substance of the Heart and its Auricles, after having sent off one Twig; which joining with others from the Trunks of the *Intercoastals*, makes the *Plexus Cardiacus Superior*; which sending out one Branch, which strictly embraces the Pulmonary Artery, bestows the rest upon the Heart it self.

*App.
Tab. xvi.*

*Plexus
Cardiacus
superior.*

Proceeding yet farther, it sends out divers Ramifications, which meeting again together, make the *Plexus Pneumonicus*, from which many nervous Fibres are sent out, which embrace and constringe the Vesicles and Vessels of the Lungs, as well those of Air as of Blood, which they variously enfold and twine about.

*Plexus
Pneumo-
nicus.*

In its passage downwards it distributes several Branches to the *Oesophagus*, along which it runs. About the lower *Vertebræ* of the Back the Trunk is divided into two Branches, call'd the external and internal, which communicate with each other by the concurrence of several Ramifications. But afterwards these two principal Branches join again, the Internals of each side with one another forming one Trunk; and the Externals by their Communication forming another; and passing the *Diaphragm*, they are spent upon the Stomach, especially its upper Orifice. The remainder of this Pair joins with the *Intercostals*, in the Formation of several *Plexus* in the lower Venter, and in them it seems to terminate.

App.
Tab. xvi.

Intercostals.

Plexus Cervicales.

Truncus Intercostalis.

The Trunk of the *Intercostal* Nerve consists of nervous Filaments, deriv'd partly from the Brain, which are the Branches of the fifth and sixth Pair, (whose Coalition in a *Sinus* of the Skull near the *Sella Equina*, we have already taken notice of) and partly from the Spinal Marrow, by those Branches which they receive from the Vertebral Nerves. In each Trunk of these Nerves, before it arrives at the *Thorax*, are two *Plexus Gangliiformes*, call'd *Plexus Cervicales*; the upper of which receives a Branch of a Nerve from each Trunk of the *Par Vagus*, and is situate just at the egress of the Skull. The next *Plexus* is about the middle of the Neck, and sends out divers Ramifications to the *Oesophagus* and *Aspera Arteria*, and one larger than the rest to the recurrent Nerve. From this *Plexus* likewise descend two pretty considerable Ramifications to the Cardiac *Plexus*, which are join'd a little lower by a third.

From this second *Plexus* the *Intercostal* Trunk descends to the Clavicles, where being split into two, it embraces and constringes the Subclavian Artery; thence entering the *Thorax*, it receives three or four Twigs from the upper Vertebral Nerves,

Nerves, together with which it constitutes the *Plexus Intercoftalis*, and from thence descends along the fide of the *Vertebræ*, receiving a nervous Twig from every one of them to the *Os Sacrum*, and coming into the *Abdomen*, it forms feveral confiderable *Plexus*, which are the *Lienaris*, *Hepaticus*, the two *Renales*, *Mefentericus Magnus*, and two little ones in the *Pelvis*. App. Tab. xvi. Several confiderable *Plexus*.

After this has reach'd the *Abdomen*, it fends off on each fide a confiderable Branch, call'd, by *Willis*, *Ramus Mefentericus*, out of which the afore-nam'd *Plexus* are form'd. This Branch is divided into two others; of which the bigger, turning towards the Stomach, forms a *Plexus*, from which come four *Fafciculi*, or Bundles of Fibres, to the Stomach, to the Spleen, to the Hepatick *Plexus*, and the great *Plexus* of the Mefentery. Ramus Mefentericus.

Upon the right fide the Mefenteric Branch is sub-divided into two, (as is that of the left likewise) the Superior of which makes the main part of the *Plexus Hepaticus*; from whence proceed a great Number of Nerves to the Liver, ftrictly embracing, as it were with a kind of Net-work, the Blood-Veffels, and fending out their refpective Ramifications to the Gall, Bladder, and Biliary Ducts; and likewise to the *Duodenum*, *Pylorus*, and *Pancreas*. This *Plexus*, by means of fome Ramifications, communicates with the *Plexus Lienaris*, (which is form'd out of the Branches of the left *Intercoftal*) and likewise with the *Mefentericus Magnus*, and *Renalis Dexter*. Plexus Hepaticus. Lienaris. App. Tab. xvi.

The lower Branches of the Mefentericks, near the *Capsula Atrabilaria*, form the *Plexus Renales*, from whence feveral nervous Fibres go to the Kidnies, which accompany and involve the Blood-Veffels, as in the Liver. Plexus Renales.

The great Mefenteric *Plexus* is form'd out of the concurrent Branches of feveral other *Plexus*, and Mefentericus Magnus.

and sends its nervous Fibres through the whole Mesentery, along with the Meseraic Vessels; which, with various Circumlignations, they accompany to the Intestines. Other Branches it sends to the Trunk of the *Aorta Descendens*, and to the Ovaries in Women.

Plexus Infimus Abdominis.

A little below the Kidnies, the Trunk of the *Intercostals* verges a little inwards, and descends into the *Pelvis* to the *Os Sacrum*; about the beginning of which, together with the Vertebral Branches, it makes the lowest *Plexus* of the *Abdomen*; from whence a tolerable Branch being reflected a little upwards, makes near the former another little *Plexus*, which is the least of all.

Minimus.

From these two *Plexus*, a Branch is return'd to the great Mesenteric *Plexus*, which in its way visits the *Intestinum Rectum* and *Colon*. Another Branch descends from the lower *Plexus*, behind the *Intestinum Rectum*, to which all along it gives several Twigs. The Remainder, having sent off some Ramifications to the Ureters, proceeds downwards to the *Sphincter Ani*, into which, and the neighbouring Parts, it is distributed.

The ninth and tenth Pair are already spoken to, as far as is necessary, in the Account of the Brain.

C H A P. VIII.

Of the Nerves from the Spinal Marrow.

Spinal Nerves.

BESIDES those ten Pair which arise from the *Medulla Oblongata*, within the Skull, there are thirty other Pair of Nerves, which springing from the same *Medulla*, after its Egress out of the Skull, are call'd Spinal Nerves, because of the change of Name which the *Medulla* undergoes immediately upon its *Exit* from the Skull.

Of

Of these thirty Pair seven are reckon'd to the *Division*. Neck, twelve to the *Dorsum* or Back, five to the Loins, and six to the *Os Sacrum*. These, according to their several Originations, or Places whence they take their Rise, are call'd Cervicals, Dorsals, Lumbals, and Nerves of the *Os Sacrum*.

The first Pair of Cervical Nerves arises betwixt *Cervical* the first and second *Vertebra* of the Neck, (for *Nerves*, those that have their *Exit* between the Bone of the *Occiput* and first *Vertebra*, are reckon'd the tenth Pair of the Brain) and, contrary to the rest, come out before and behind, whereas the other six Pair come but laterally from the Junctures of the *Vertebrae*, thro' particular Perforations, near the transverse Processes.

The first Pair of Cervical Nerves goes to the *First Pair*. Muscles of the Head and Ear.

The second, according to Dr. *Willis*, contri- *The second*. butes the main Branch towards the Formation of the Diaphragmatick Nerves, which, according *Diaphragmatick* to *Vieussens*, spring only from the fourth and *Nerves*. sixth Pair.

The three last Pair of the Neck, joining with the two first of the *Dorsum* or *Thorax*, make the Brachial Nerves.

All the Cervical Nerves send innumerable Branches to the Muscles, and other Parts of the Head, Neck, and Shoulders.

The Dorsal Nerves, besides what the two up- *Dorsal*. per Pair contribute to the Brachial Nerves, are for the most part distributed into the Intercoastal and Abdominal Muscles, the *Pleura* and external Parts of the *Thorax*.

The first Pair of the Lumbal Nerves sends *Lumbal* from each side a Branch to the lower side of the *Nerves*. *Diaphragm*. The second sends some Twigs to the Genital Parts: Besides some from this, as well as the three following Pair, which give the first Roots to the Crural Nerves. The rest of
the

the Branches of the Lumbal Nerves are distributed into the Muscles of the Loins and adjacent Parts.

*Nerves of
the Os
Sacrum.*

The first three or four Pair of the Nerves of the *Os Sacrum*, are bestow'd entirely upon the Crural Nerves; the rest upon the Muscles of the *Anus, Vesica, and Genital* Parts.

*Brachial
Nerves.*

The Brachial Nerves, which are the Offspring partly of the Cervical, and partly of the Dorsals, after the several Branches of which they are compos'd, have been variously complicated and united, run but a little way in a Trunk before they divide again into several Branches, which are variously distributed into the Muscles of the Skin and Arms.

*Diaphrag-
matick
Nerves.*

The Diaphragmatick Nerves, which are likewise the Offspring of the Cervical, after joining in a Trunk, run thro' the *Mediastinum* undivided, till they arrive near the *Diaphragm*, into which they send off divers Branches, some into the Muscular, others into the Tendinous Part of it.

*Crural
Nerves.*

The Crural Nerves, which consist of an Union of six or seven Pair, *viz.* the three last of the Lumbal, and three or four first of the *Os Sacrum*, after having spent their upper Branches upon the Muscles of the Thigh and the Skin, as far as the Knee, proceed in a Trunk downwards, which sends its Branches to the Extremities of the Toes, supplying, as it goes, the Muscles and Skin of the Leg and Foot. This is the largest and firmest nervous Trunk in the whole Body.

C H A P. IX.

Of the Face.

THE Face itself, as to its external Figure, is so well known to every body, that it needs no anatomical Description or Division. For tho' it be the Part the most regarded, as well by the judicious as voluptuous Part of Mankind, for Information as well as Pleasure; and tho' we be thence inform'd in many Cases, not only of the Passions of Mens Minds, but the Distempers of their Bodies likewise; yet it affords but little Matter for anatomical Speculation, which will be more properly handled in the Description of the several Parts, which being to be distinctly treated of, we shall refer them thither.

C H A P. X.

Of the Nose.

By Mr. William Cowper.

THE Nose has been usually divided into internal and external; which Division I mention, because it is constantly found in the Writings of Anatomists, though it be of no great Importance.

It is again sub-divided into several Parts, which make up its external Figure; of which the first is the *Dorsum*, or Ridge, running along the whole length of it. In which, one part, (in those we call Roman Noses especially) about the middle, is more prominent than the rest, and is call'd the Spine; and the Extremity, which in many is

*External
Parts.*

*Dorsum
Nasi.*

turn'd round, is nam'd the *Orbicular*, or tip of the Nose ; the sides are call'd the *Alæ* or *Pinnæ*.

*The Mus-
cles of the
Nose.*
Elevatores
Alæ Nasi.
Tab. xviii.
Fig. i.

The Teguments of the Nose, which are common to it, and other parts of the Face, being remov'd, the Muscles of the *Alæ Nasi* appear. The first of these is of a pyramidal Figure : It is very narrow, though fleshy, at its Origination on the fourth Bone of the upper Jaw, near the *Foramen Lacrymale*, and upper-part of the Nose by the great *Canthus* of the Eye, and becomes very broad and thin at its fleshy Termination, on the side of the *Ala Nasi*. When it acts it pulls the *Ala* upwards, and turns it outwards.

Dilatato-
res Alæ
Nasi.
Tab. xviii.
Fig. ii, iii.

The next Muscle, or Pair of Muscles, are common to the *Alæ Nasi* and upper Lip. They arise thin, broad, and fleshy from the Cheek-Bones, under the Orbits of the Eyes, and descend obliquely with a two-fold Order of fleshy Fibres in each Muscle, which partly terminate in the upper Lip, and partly in the *Alæ Nasi*. These draw the *Alæ* from each other, and widen the external openings of the Nostrils.

Constri-
ctores
Alæ Nasi.
Tab. xviii.
Fig. iii.

The third Pair are also common to the *Alæ* and upper Lip. They arise fleshy from the fore-parts of the fourth Bone of the upper Jaw, immediately above the Gums of the *Dentes Incisarii*, and are soon inserted after a straight ascent to the Roots of the *Alæ Nasi*, and superior parts of the upper Lip. These draw the *Alæ* downwards nearer each other, and at the same time draw the upper Lip also downwards ; which Action we use when we take Snuff, or endeavour to receive any odoriferous *Effluvia*.

The Frame of the Nose is mainly supported by two Bones, which end in Cartilages of a triangular Figure, and are divided in the middle by a third into two Partitions, called the Nostrils ; this *Septum* ends likewise in a Cartilage, by means of which Cartilages the lower part of the Nose is render'd

render'd moveable, which the upper that is perfectly Osseous is not.

The Cartilages of the *Alæ Nasi* are ty'd to those at the Extremities of the two Bones of the Nose by Ligaments, which loose Connection renders them moveable. Professor *Ruyfch* (*Epist. Anatom. 8.*) tells us of two Pair of Cartilages more that belong to this part, which are not existent in all, or in most Bodies; and if there ever were such, must be look'd upon as a *Lusus Naturæ*. Tab. xvii. Fig. i, ii, iii.

The Bones of the Nose are either proper or common. The proper are such as are only subservient to the use of the Nose: The common help to frame the *Foramina Narium*, as well as the Neighbouring parts. Bones of the Nose, common and proper.

The first of the proper Bones of the Nose are the two external ones, mention'd above, that constitute the *Dorsum Nasi*; they are the most solid of all the Bones of this part, and are join'd to the *Ossa Frontis*, fourth Bone of the upper-Jaw, and to each other *per Harmoniam*, but in some subjects *per Suturam*, especially at the *Ossa Frontis*, and fourth Bone of the upper-Jaw: They are each of a Quadrangular Figure; their lower parts that are joined with the Cartilages of the *Alæ* are uneven; they have each a remarkable Aperture externally for the Blood-Vessels, from which Branches pass to the Glandulous Membrane, that cleaves to the insides of these Bones, which are furrow'd: Their out-sides are smooth. 1st, proper Bone. Tab. xviii. Fig. i. H.

In the Concave of the Arch of those two Bones, at their union with each other internally, is plac'd the bony part of the *Septum Narium*. Its upper part joins with the *Os Ethmoides*; but in Adults is continued, so that the *Os Ethmoides* and its Process, call'd *Crista Galli*, appear to be one entire Bone with this *Septum*. It is thinnest in 2d, proper Bone call'd Septum. Ib. Fig. v. C. II. Crista Galli.

App.
Tab. xlix.
Fig. iii.

its middle, where there are frequently found some irregular inequalities, and divides the right Nostril from the left : Though its Position is seldom found perpendicular, but commonly inclines to one side or t'other variously in different Bodies ; its upper part (continued from the *Ethmoides* to the *Os Sphenoides*) is thickest, but soon becomes very thin towards the *Fauces*, or back-part of the *Foramina Narium*. This *Septum* is capt with another thin Bone, call'd *Vomer Aratri*, from its Figure. The lower part of this *Septum* is joined to the Internal and Superior Surface of the fourth Bone of the upper Jaw, that makes the Roof of the Mouth, and backwards again to the *Ossa Palati* by Harmony.

Vomer.
Tab. xviii.
Fig. i. N.

Ossa Tur-
binata
feu Spon-
giofa.
Tab. xvii.
Fig. iv. I,
K.

The other proper Bones belonging to the Nose, are call'd *Turbinata* and *Spongiosa*. There are commonly found two of these Bones in each Nostril, placed one above the other, in some Subjects you'll find three ; the two lowermost are never wanting in a natural State ; the uppermost, that seems to be a part of the *Os Ethmoides*, is very irregular, and is but rarely seen ; the middlemost, which is always the largest when there are three, cleaves to the side of the fourth Bone of the upper Jaw, that is next to the *Foramina Narium* of the same side, which part of the fourth Bone of the upper Jaw, makes the Internal *Paries* of the *Antrum Maxillæ Superioris* next to the *Foramen* of that Nostril. This *Os Turbinatum* is so placed, as to shelter or cover the Perforation of the *Antrum* into the Nostril, and prevents the sudden rushing in of Air from the Nostril into the *Antrum*.

Ib. K.

The third and lowermost *Os Turbinatum* in Adults, is not distinguish'd by any Suture from the sides of the *Antrum Maxillæ*, but seems to be a Production of the *Antrum* turning down towards the *Os Palati*, and Internal Surface of the fourth Bone

Bone of the upper-Jaw, that makes the Roof of the Mouth.

All these *Ossa Turbinata* are very Porous, and are turn'd not unlike the Shell of the *Concha Veneris*.

In Quadrupeds, especially large ones, these *Ossa Turbinata* are not only numerous, but very thin and large, and some of them are turned up not unlike to a piece of Paper rowl'd up to make Portable, so as to prevent Folds.

The common Bones of the Nose, are such as make Fences for the *Foramina Narium*, and help to compose the parts adjacent: The largest of these, is what first offers it self to our sight; which we have had occasion so often to mention by the Title of the Fourth Bone of the upper-Jaw; which is particularly describ'd among the Bones of that part, and which indeed has the greatest share in framing the *Foramina Narium*.

The external bony part of the *Foramina Narium* is fram'd by those Bones on both sides, except in the upper-part, which is supported by the two first proper Bones of the Nose, as abovesaid. These Fourth Bones of the upper-Jaw, with the *Septum* and *Ossa Turbinata*, chiefly frame the Internal *Paries* of the *Foramina Narium*: In the upper-part a Portion of the *Os Frontis*, the inside of the *Os Unguis*; the *Os Cribrosum*, with part of the *Os Sphenoides*; and backwards towards the *Fauces*, the *Ossa Palati* help to compose the *Foramina Narium*.

Besides the Cavities, circumscrib'd by the Bones now mention'd, the *Foramina Narium* have divers collateral Cavities that open into them.

The uppermost of these Cavities is found in the *Os Frontis*; this is commonly taken notice of, because it is so frequently seen in dividing the Skull to take out the Brain. In those Bodies,

Common
Bones.

Ib. K.

Tab. xviii.
Fig. i. III.

App.
Tab. xlix.
Fig. iii.

Tab. xvii.
Fig. iv. G.

where they are found, (for in some they are not existent) they are placed in the lower and middle part of the *Os Frontis*, between the Eye-brows; That of the Right being divided from the left by a bony *Septum*: In some Subjects they are very large, and extended over the Orbit of the Eyes, in whom we see the Eye-brows very prominent: Each of these open by small Ducts into the upper parts of the *Foramina Narium*, under the Superior *Os Turbinatum*. Besides these, in that part of the *Os Frontis*, that is contiguous to the *Os Unguis* in the Orbit of the Eye, there are divers irregular Cells, which also open into one another, and into the *Foramina Narium* and *Antrum Maxillæ Superioris*. Backwards these Cells also open into the Cavity of the *Cella Sphenoidis*. These Cells are not (at least commonly) taken notice of by Anatomists.

The next considerable Cavities that communicate with the *Foramina Narium*, are in that part of the *Os Sphenoides*, that frames the *Sella Equina*. These Cavities are very large, and that of the right-side is divided from the left by a bony *Septum*. This *Septum* is not always in the middle, so that these Cavities are irregular, as to their Magnitude and Figure.

When the bony *Septum* happens to divide 'em equally, as in a Subject now before me, they are each about three quarters of an Inch in length, and more than half an Inch in breadth: In another Subject the Sphenoidal Cavity of the left-side is more than twice as big as the right, and their *Septum* inclines to the same side with the *Septum Narium* of the same Subject. They have each an opening into the *Foramina Narium*, under the *Os Turbinatus Superius*. Neither these Cavities of the *Os Sphenoides*, nor those large ones of the Cheeks, are found in a *Fœtus*, but instead thereof

an

an Osseous *Meditullium* only possesses these parts, not unlike the *Diploe* of the *Cranium*.

The largest and last Cavity we shall mention belonging to each of the Nostrils, is by *Casseri* Tab. xviii. call'd *Antrum Genæ*, Dr. *Higmore* calls it *An-* Fig. i. K.
trum Maxillæ Superioris: It is fram'd in the Fourth Bone of the upper-Jaw, between the lower Margin of the Orbit of the Eye, and *Dentes Molares* of the same side. Backwards the thin bony *Paries* of this Cavity with the *Os Sphenoides*, make the *Foramen Lacerum Externum*. This Cavity is near two Inches in length from the fore-part backwards, and exceeds an Inch from its Superior to its Inferior Surface; its Figure inclines to a Triangular, with very obtuse points: To discover it fairly, divide the Bone with a Saw or Chizel near the *Dentes Molares* of the upper-Jaw, and you'll presently break into this large Cavity, the Magnitude of which will a little surprize one who has not been conversant in these matters: The lower Surface of this Cavity makes a thin covering to all the Roots of the *Dentes Molares*, as well as the *Dens Caninus* of the same side, and is very thin, and frequently upon drawing any Tooth, to which it sticks, taken along with it; Lib. III. Part II. Cap. I.
whereby this Cavity is open'd into the *Alveolus*, and consequently into the Mouth. An Instance of this is mention'd by Dr. *Higmore* in a Gentlewoman, who had the *Dens Caninus* drawn upon the account of Pain, proceeding from an Inveterate Defluxion of sharp Humours that had destroy'd most of her Teeth; who upon thrusting a Silver Bodkin into the *Aveolus*, was exceedingly frightned to find it pass, as it did, almost to her Eyes. And upon farther Trial with a small Feather stript of its Plume, which she thrust up a Hand's breadth or more, was so terrify'd at it as to consult the Doctor and others about it, imagining nothing less than that it had gone to her Brain:

But they considering the Circumstances of the matter, found that the Feather had doubled only in this Cavity, and gave the Lady full satisfaction in that point. The Doctor has given us a Figure of it, though no very exact one. Of this I have met with frequent Instances where the Patients have all done very well again, and the Aperture it self closed after Injecting a proper Medicine to cleanse the *Antrum* from any offensive Humour.

Tab. xviii.
Fig. i.

This Cavity or *Antrum Genæ* has a Communication, as the rest have, with the *Foramina Narium*, with this difference; whereas those are less Cavities, and all plac'd above the lower parts of the *Foramina*, and have large openings into the *Foramina Narium* from their lower-parts; Those of the Cheeks are the largest of any about the Nose, and have lesser Apertures whereby they communicate with the *Foramina*; and these Small openings here, are placed in the upper parts of these Cavities, though the lower parts of them are even with the lower parts of the *Foramina Narium*; by all which it appears by what difficulty any peccant Humour lodg'd in either of these Cavities, can be discharg'd by the *Foramina Narium*, since these Cavities must either be fill'd to the top ready to run over first, or the Head must be held down to procure the discharge. This induced me to put in practice an Operation in the Cure of an *Ozæna*, which appeared reasonable to me by the Structure of the Part, I being convinc'd it might be done without hazard to the Patient. After the foremost *Dens Molaris* was taken out, and not finding an Aperture from its *Alveolus* into this *Antrum*, which in other Instances I have seen happen, with a convenient Instrument I bor'd the hole of the *Alveolus* thro' into the *Antrum Genæ*, whereby the *Pus*, which before lay in the *Antrum* readily run out, and the Medicines

Medicines that were daily injected by this Aperture, pass'd into the Nostrils, whereby the Patient was cured, tho' this Disease had continu'd with a vast Flux of stinking Matter daily from the Nose, for more than four Years before this Operation.

I need not tell you how so much Matter could *The Pituita* flow from this Cavity, when you consider, that *separated.* not only these Cavities of the Cheeks, but all those of the Nose, mention'd above, as well as the *Ossa Turbinata, Septum Narium, &c.* are invested with a Membrane furnish'd with large Arteries from the *Carotides* and Veins, that empty themselves into the Jugulars and Nerves, from the *Par Quintum*, as well as the Olfactory Nerves. In this Membrane are a great Number of small Glands placed very near each other. In an *By small* Oxes-Head you may perceive the Orifices of their *Glands.* Excretory Ducts, by the Appearances of the *Mucus* they discharge on pressing this Membrane with the back of a Knife, &c. From these Glands *How seen.* flows all that *Pituita* that is commonly discharg'd at the Nostrils.

The Use of this *Pituita* is to keep the Membrane soft, and defend it from the Injuries of *The Use of* Extraneous Bodies, especially those in the Air, *the Pituita.* which must pass this Way in Inspiration, when the Mouth is shut. By this means the Olfactory Nerves expanded on this Membrane, are render'd capable of the Perception of Odoriferous *Effluvia*, which otherwise the Dryness of the Part would destroy.

By this Plan we may guess the Design of Nature, in framing so many Cavities, turnings and windings in the *Foramina Narium*, is to expand the Olfactory Nerves in so small a Compass, which are every where distributed in them, but particularly on the *Ossa Turbinata*: And that Smelling is no otherways perform'd, than that by Inspira-
tion

tion the Odoriferous *Effluvia* of Bodies are brought to a Contact with the Olfactory Nerves.

Besides this Use of the Nose, which is the principal; Nature has made it, as it were, a *Diverticulum* to the Eyes; for there's a considerable Passage into each Nostril, that empties itself under the middle *Os Turbinatum*, which arises from two Apertures call'd *Puncta Lachrymalia*, at the great *Canthus* of each Eye. By this way the superfluous Moisture of the Eyes is carried off, which would otherwise incommode the Cheeks, as you see it does when any Disorder affects these passages, as in the *Ægilops* and *Fistula Lachrymalis*.

While these Papers were Composing at the Press, a Young Gentleman became my Patient, who had labour'd under an Apofthemation in this *Antrum Maxillæ Superioris*, between four and five Years: I had seen him about a Twelve-month since, when I told him where the Seat of his Disease was; and the way I would take to cure him, which he unluckily neglected: And notwithstanding the Arguments used by an Ingenious and Learned Physician, as well as against his own Inclinations, he was at that time prevail'd with to defer drawing his Tooth, (which I proposed to him) till Time with the Increase of his Malady, and a late Instance of Success I had in the like Case, on a Person of the first Rank in Sense as well as Quality, had confirm'd him of the Necessity of doing it: By this time the Matter had of its self made way by the farthest *Dens Molaris* of the left-side, in so much that before the Tooth was drawn, I pass'd a Probe by the side of it into the *Antrum*. The Day after the Tooth or Stump (for the greatest part of it was mouldred away) was taken out, an ordinary Spoonful, at least, of the worst colour'd and scented *Pus* flowed at the Socket, on holding
his

his Head back ; I then Syring'd it with a proper Injection, which I continue daily, it now being but three Days since he told me he had very little use for his Handkerchief which he used to change five or six times in a Day for three or four Years before : On visiting him the Seventh Day, when this Sheet came to be revis'd, he told me, *To his Admiration, He was not only freed of the Flux at his Nose, and violent Pains in his Head, particularly in his Eyes, but restor'd* (as he express'd it) *to a perfect Tranquility of Health.*

Here I must not omit the Case of an Elderly Gentleman, who had for a longer time labour'd under a Discharge of a great Quantity of Fœtid Matter from his Nose ; after I had told him how he might be reliev'd, he was by others laugh'd out of the Project (as they call'd it) till at length the thing itself convinc'd him of the Truth of what I told him. When he consulted me again, which was several Months after I first saw him ; he then sent for a Tooth-drawer to take out the Tooth I should direct : Though the Operator attempted it with proper Dexterity, not only the Tooth which appear'd sound, (but was not so) on which he applied his Instrument, but the next Tooth also with their *Alveoli* or Sockets came away all together ; this frightened the Tooth-drawer, but I shew'd him it was none of his fault, but that the Corrosive Matter which had been so long suffered to lie on the Bone, had rotted it : In doing this the Patient did not complain of Pain, and was reliev'd of the Discharge at his Nose, (the Matter finding a ready Passage at the Breach) but was afterwards pursu'd with extravagant Pains in his Face and that side of his Head ; and at length, after some Months, fell into Convulsive Disorders, and Died.

On opening his Head I found the upper-part of the *Antrum* (between I, c, * Tab. XVIII).
Carious,

Tab. xv.
B.

Carious, and part of that Bone moulder'd away ; but the *Caries* did not stop there, a *Sinus* being made through the Tract of the *Foramen Lacerum*, the opposite part of the *Os Sphenoides*, was also perforated, and the *Dura Mater* laid bare, and not perforated ; but on the contrary it was inflamed and very much thickned on that side the Head : I found an Aposthemation in the Cortical Substance of the fore-part of the hinder Lobe of the Brain, of the same side, though cover'd with the *Pia Mater*, in which was about an Ounce of Fœtid Matter.

T A B. XVII.

F I G. I, II, III.

THE Muscles and Cartilages of the *Alæ Nasi*, all as big as the Life.

A A, The *Musculus Elevator Alæ Nasi*, in its natural Situation, Fig. I. and hanging down at its Termination, Fig. II.

a, A small fleshy Muscle found in most Subjects, lying under the lower part of the former, arising from the

second Cartilage, and inserted to the first that makes the *Ala Nasi*.

B, The *Musculus Dilator Alæ Nasi* and *Elevator Labii Superioris*.

C C, Part of the Cartilaginous *Septum*, between the Cartilages of the *Alæ*.

D, The first proper Bone of the Nose bar'd.

F I G. III.

THE Cartilages of the Nose on the left side.

1. The first Cartilage that makes the *Ala Nasi*.

2. The second ty'd to the first, by a Ligament, (*) the superior edge of which (†) cleaves firmly to the Bones of the Nose, Fig. II. D.

a, The little Muscle ex-

prest Fig. II. here pin'd out.

b, Part of the *Musculus Elevator Labii Superioris*, fix'd to the Cartilage of the *Ala Nasi* ; which part of the Muscle on each side, makes that furrow from the *Septum Narium*, on the middle of the upper Lip.

C, Part

Fig. III.

Fig. I.

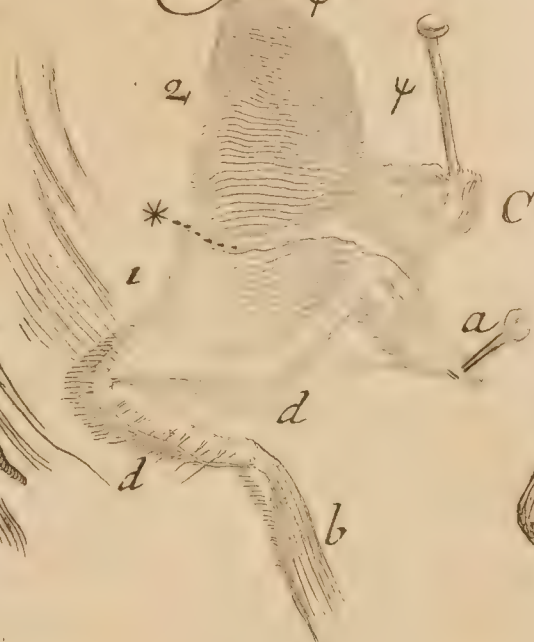


Fig. II.

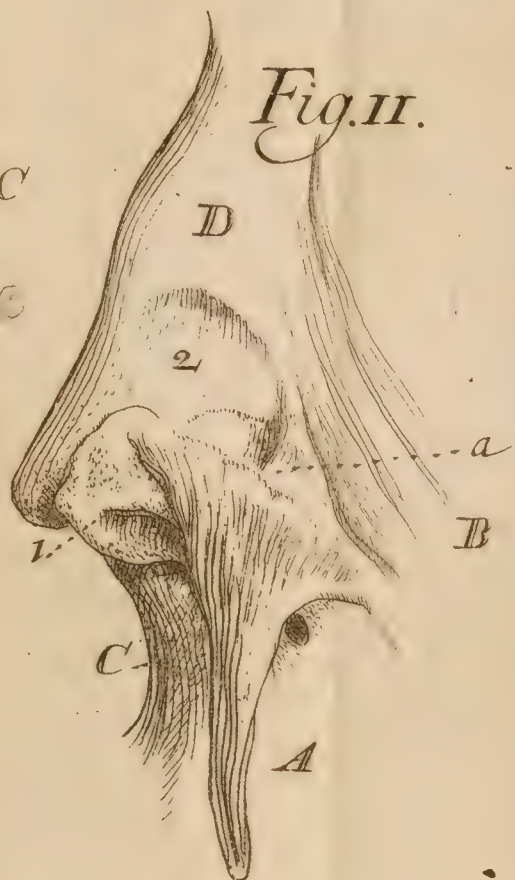


Fig. IV.

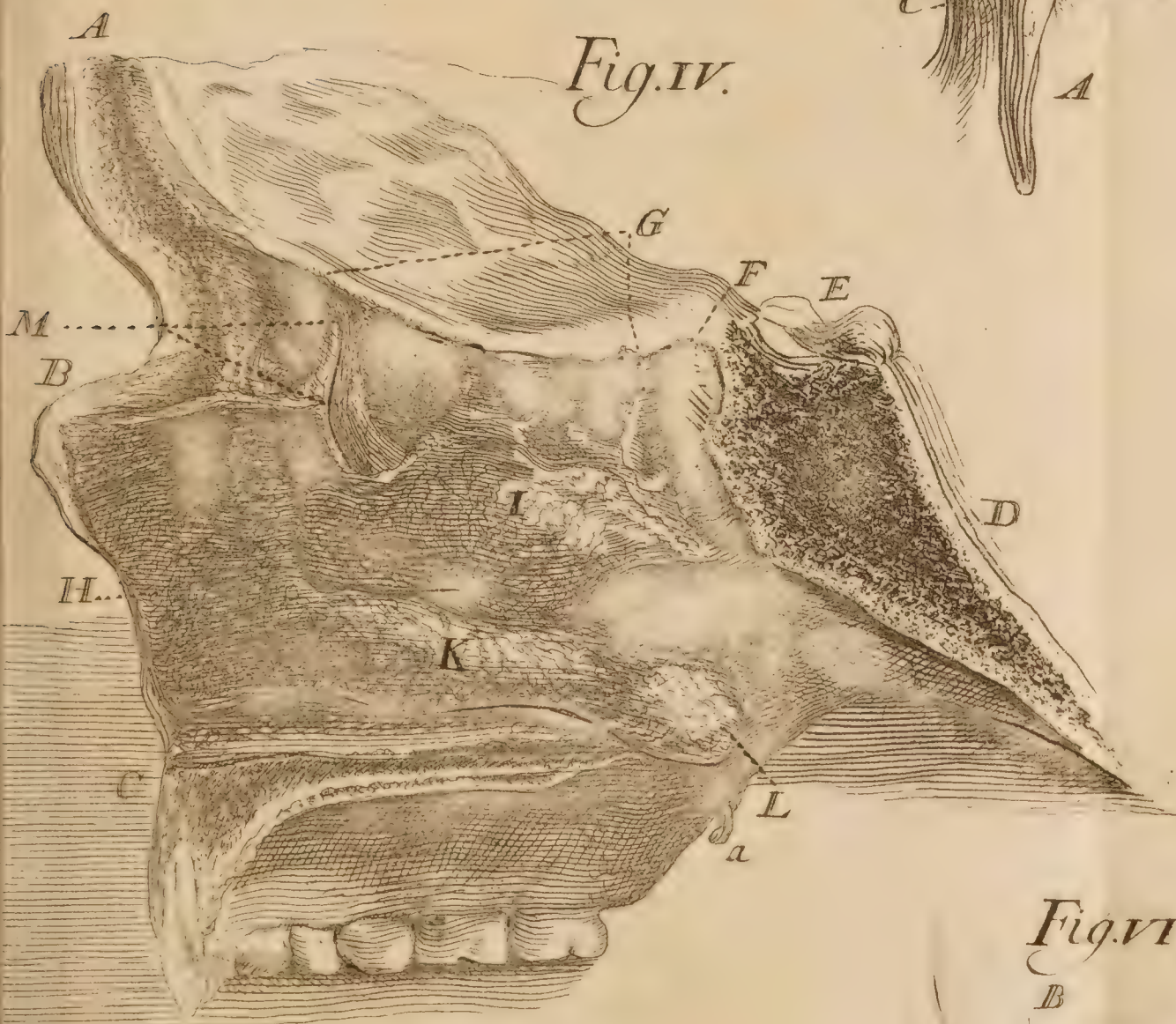


Fig. VI.

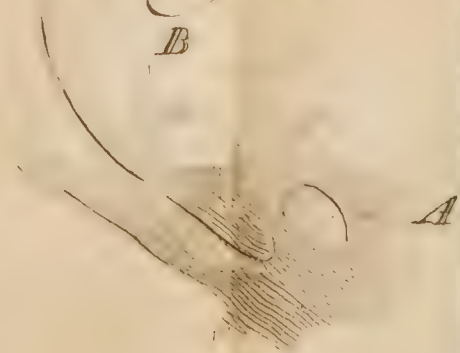
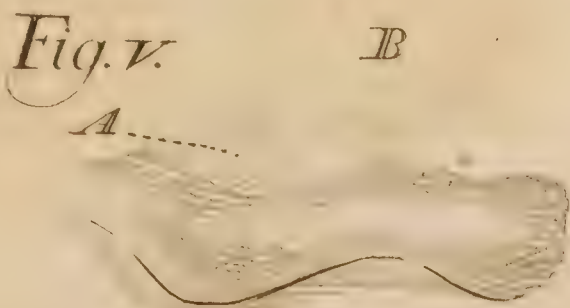


Fig. V.



C, Part of the *Musculus Dilatator Alæ Nasi*, and *Elevator Labii Superioris*.

dd, The Hairs of the Nostrils arising out of the Cartilage of the *Ala*.

F I G. IV.

THE inside of the right *Foramen* of the Nose, as it appears in a Perpendicular Section of the Skull, through the middle of the *Os Frontis*, close by the sides of the *Crista Galli*, and *Septum Narium*, with the *Os Palati*, and foremost *Dens Incisorius* on the left side, as big as the Life.

A, The *Os Frontis*, divided, which in this Subject had no Cavity that communicated with the Nostril.

B, The first proper Bone of the Nose divided.

C, The Fourth Bone of the upper Jaw, and *Os Palati*, also divided, with the foremost *Dens Incisorius*.

D, the Anterior *Appendix* of the *Os Occipitis* also divided.

E, The *Sella Turcica*, fram'd at the conjunction of the *Os Sphenoides* and *Occipitis*.

F, The *Sella Sphenoidalis* open'd.

G, The three or four other *Cells* of the *Os Sphenoides*, and Frontal Bone by the Orbit of the Eye; which also communicate with the *Foramen Narium*, and are all invested with the Pituitary Glandulous Membrane.

H, The Pituitary Glandulous Membrane covering the inside of the *Foramen Narium*, and its Cavities; particularly

I, the *Os Turbinatum Superius*, and

K, The *Os Turbinatum Inferius*, at the extremity of which next the *Fauces*, is

L, A Glandulous Body hanging loose, and very much resembling the *Uvula*. This becoming relax'd, whether by Ulcers, or Excoriations, in the Neighbouring parts, or by Catarrhs; occasions that fluttering Noise, which we hear in blowing of the Nose, and sometimes in ordinary Respirations.

a, Part of the *Processus Pterygoides*.

M, A Chink, or Furrow, which passes under the forepart of the *Os Turbinatum Superius*, into which opens one of the Perforations from the *Antrum Maxillæ Superioris*, express'd Tab. XVIII. Fig. I. L. in the lower part of which Chink in this Subject, was the Aperture to that *Antrum*, express'd Fig. VI. By a Probe passing through it. B.

F I G. V.

THE inside of the *Os Turbinatum Superius*, express'd at I, Fig. IV. cover'd with its Glandulous Membrane.

A, A Cavity or Depresure of this Bone opposite to

the *Foramen* express'd at A, Fig. VI.

B, The upper-part of the *Os Turbinatum*, which adher'd to the sides of the *Cells* G, Fig. IV.

F I G. VI.

THE two Apertures from the *Antrum Maxilla Superioris* into the *Foramen Narium*, of the right-side, as they appear when the *Os Turbinatum Superius* (marked I, Fig. IV.) is remov'd.

A, The Posterior, or larg-

est Perforation that opens against the Cavity, or Cell of the *Os Turbinatum*, Fig. V. A.

B, The end of a Probe passing out of the foremost and lesser Perforation in the Chink, at M, Fig. IV.

T A B. XVIII.

F I G. I.

THE right-side of the Skull with its *Basis* turn'd somewhat upward, the better to shew the *Antrum Maxillæ Superioris*, which is here open'd after sawing off the lower part of the Cheek Bone, as big as the Life.

A, The *Os Frontis*.

B, The *Bregma*.

C, The Occipital Bone.

D, That part of the *Os Temporum*, call'd *Os Squamosum*.

E, That part of the *Os Sphenoides*, that is touch'd by the *Os Frontis*, *Bregma* and Squamous part of the Temple-Bone.

aa, The *Sutura Coronalis*.

bb, The *Lambdoides*.

cc, The *Squamosa*.

F, The Cheek-Bone reckon'd the first of the upper-Jaw.

** Its lower-side saw'd off in order to see the *Antrum Maxillæ Superioris*.

G, The Second Bone of the upper-Jaw call'd *Os Lachrymale*, *Os Unguis*, &c.

H, The first proper Bone of the Nose.

III, The Fourth Bone of the upper-Jaw, in which is,

K, The

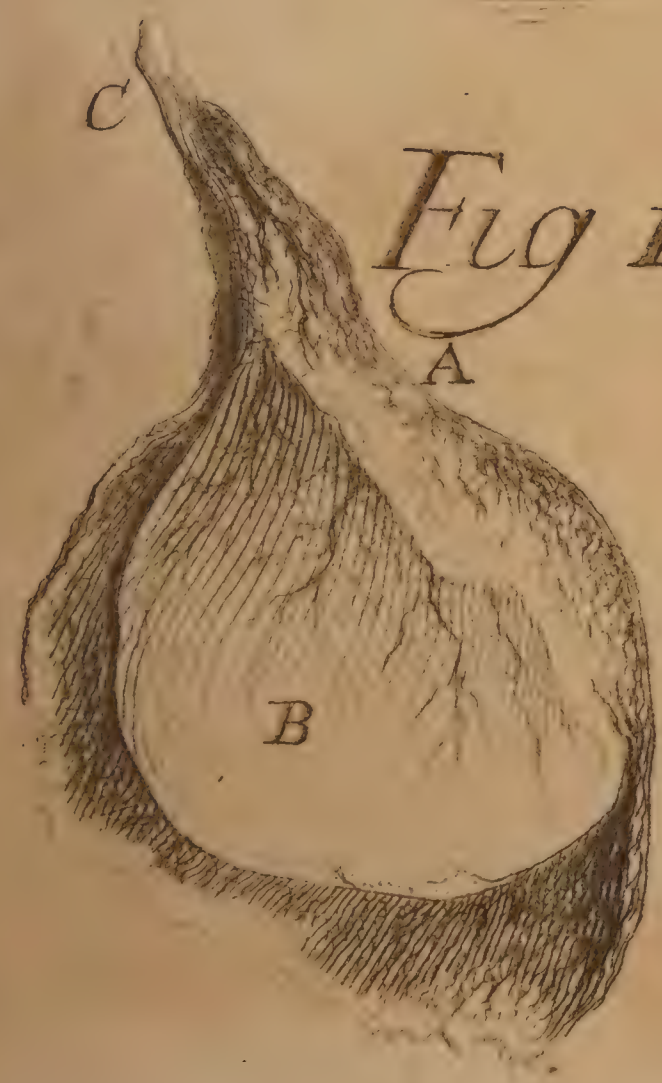
Fig. II.



Fig. I.



Fig. III.



K, The *Antrum Maxillæ Superioris*, whose external Surface is here remov'd, to shew the Glandulous Membrane that lines its inside, in which its numerous Blood-Vessels appear.

L, Two *Foramina* in its upper part, which open into the *Foramen Narium* of that side, as express'd in the preceding Table, Fig. VI. A. B.

M, The Thickness of the sides of the *Antrum*, above the Roots of the second *Dens Molaris*.

N, Part of the *Os Palati*.

OO, The *Processus Pterygoides*.

PP, The *Processus Styloides*.

QQ, The *Processus Mastoideus*.

R, The external Surface of one of the Processes of the Occipital Bone, which is articulated with the first *Vertebra* of the Neck, on the right side.

S, The hole in the Occipital Bone, by which the *Medulla Oblongata* passes out of the Skull.

T, The internal Aspect of the left occipital Process, that is receiv'd in a corresponding Depressure of the first *Vertebra* of the Neck. The Perforation here express'd serves for the Transmission of one of the ninth Pair of Nerves.

V X, A Prominence and rising Seam in the Occipital

Bone, at the Termination of the Muscles of the Head, to which the *Ligamentum Colli* is fix'd at V. This, in some Skulls, is much larger than here express'd; in others you will find no Prominence in this part of the Bone.

Y, The *anterior Appendix* of the *Os Occipitis*, to which the *Musculi Annuentes* and *Flexores Capitis* are inserted.

d, The *Meatus Auditorius*.

e, The *Os Jugale*, compos'd by a Process of the *Os Temporale*, and first Bone of the upper Jaw.

f, A shallow Depressure of the *Os Temporum*, in which a moveable Cartilage is placed for the Articulation of the lower Jaw.

g g g, The Suture of the *Os Temporum*, with the *Os Sphenoides*.

h, A Perforation by which a Branch of the fifth Pair of Nerves passes the *Basis* of the Skull, reckon'd the third Perforation of the *Os Sphenoides*.

iii, The *Alæ*, or Wings of the *Os Sphenoides*, call'd *Pterygoides*, from the external Surface of which (here express'd on the right side) the *Musculus Pterygoideus Externus* does arise; as does the *Musculus Pterygoideus Internus*, from the internal Surface of this Process, here seen on the left side i.

F I G. II.

A Side-view of Part of the Bones of the upper Jaw, and Nose, after the lower part of the Cheek-Bone was saw'd off to discover the *Antrum Maxillæ Superioris*; the Cartilages of the Nose, express'd Fig. III, in the preceding Table, being remov'd to shew the *Septum Narium*: Drawn from a diseased Body that died maciated.

A, The *Os Frontis* bared.

B, The Cheek-Bone, or first Bone of the upper Jaw.

C, The cartilaginous part of the *Septum Narium*, cover'd with its Glandulous Membrane, full of Blood-Vessels.

D, A *Cystis*, or Glandulous Bag, distended with

mucous Matter, which fill'd the *Antrum*.

a a, A Branch of an Artery fill'd with Wax, passing to the Forehead.

b, The *Trochlea*, or little hollow Cartilage, through which the Tendon of the *Musculus Obliquus superior Oculi* passes.

c, The *Foramen* compos'd by the second and fourth Bone of the upper Jaw, by which the superfluous Moisture of the Eye is convey'd to the *Foramen* of the Nostril.

E, The Branch of an Artery with one of the fifth Pair of Nerves, passing out at a Perforation in the fourth Bone of the upper Jaw.

F, The *Ala* of the *Os Sphenoides*.

F I G. III.

THE *Cystis*, express'd at D in the preceding Figure, taken out, fill'd with the mucous Humour.

A, Its external Glandulous Membrane, full of Blood-Vessels.

B, Its middle Membrane with fewer Blood-Vessels, besides which it had an Internal transparent Membrane, like the *Tunica Allantoides*, in which the mucous Humour was contain'd.

C, Its Root or *Pedunculus*, by which it grew to the upper part of the *Antrum*.

After this *Cystis* was remov'd, it was remarkable that the Cavity of the *Antrum Maxillæ Superioris* had still a Membrane, tho' thinner than is natural, that invested it.

N. B. Had these *Antra* of the upper Jaw been oftner look'd into, I am apt to think they would have been found the Seats of other Disorders; perhaps of the *Catarrhus Suffocatorius* of the Ancients, which they thought proceeded from the Brain.

CHAP.

C H A P. XI.

Of the E Y E S.

JUST above the ORBIT, or hollow in which Supercilium. the Eye is receiv'd, externally appears the Eye-brow, in form of a Segment of an *Ellipsis* cover'd with Hair, which springs from some Glands and Fat placed betwixt the Skin and *Panniculus Carnosus*, upon the upper edge of the Bone, and is contriv'd by Nature to arrest the Course of Sweat, and keep it from falling into the Eye.

From hence is immediately continu'd a Mus- Palpebræ. cular Membrane, which with the Skin makes the upper Eye-lid, and is answer'd on the lower part by another of the like Figure and Structure, which together serve to cover and defend the Eye in the time of Sleep, and upon other Occasions.

Both upper and under Eye-lid are fring'd with Cilia. Hair, especially the upper, which is larger and stiffer than that of the under, and seems to be a Contrivance to break the too fierce Impression of the Rays of Light; as likewise to keep out Flies and Moats, and other things that float in the Air, which annoy the Eye.

These Hairs spring from a small row of Cartilage. Glands, which cover a thin, tender Cartilage, which edges each Eye-lid, and serves as a kind of a Ring to stretch them upon.

These Eye-lids are both moveable, especially Muscles. the upper, which has two Muscles to raise and depress it, which are call'd *Attollens* and *Depri-* Attollens. mens. The first of which arises from the bottom App. Tab. of the Orbit of the Eye, near the entrance of the xvii. Fig. vi. Optick Nerve, where it is tendinous, soon grow-
Y ing

ing fleshy afterwards, and with a broad thin Tendon terminating in the upper Eye-lid.

Depri-
mens, or
Orbicularis.
Tab. xviii.
Fig. ii.

The Deprioment springs from each corner of the Eye, and is answer'd by another of like Figure and Structure in the lower Eye-lid; which are therefore often consider'd together by Anatomists, as one Orbicular Muscle. It is a fleshy Muscle, whose Fibres environ the Eye-lids, and are inserted into them, not unlike the Sphincters of other parts. It is fastned to that part of the Margin of the Orbit, towards the Nose, which is made by the fourth Bone of the upper Jaw.

Besides these Muscles, the Eye-lids are mov'd secondarily by others. The upper being retract-ed by the Muscles of the Forehead, and the lower by those that move the Lip and under-Jaw.

Verhey-
en's Mus-
cle.

Verheyen has observ'd a small Muscle, which arises from the first Bone of the upper-Jaw, and terminates in the Carnous or Musculous part of the lower Eye-lid.

Mem-
branes.

The inside of the Eye-lid is lin'd with a thin, fine, smooth Membrane from the *Pericranium*; and the outside is protected by the common Coverings of the rest of the Face, the Cuticle and Skin.

Canthi.
App.
Tab. xvii.
Fig. i.

At the commissure or joining of the Eye-lids, are form'd two Angles or Corners, of which the inner (that next the Nose) is call'd *Canthus Major*, the other *Minor*. In the former of which lies a small Gland of an oblong Figure, which is

Glandula
Lachryma-
lis.
App.
Tab. xvii.
Fig. v.

call'd *Glandula*, or *Caruncula Lachrymalis*, tho' perhaps improperly. From this Gland proceed two or three small Ducts, which opening upon the inner Surface of the Eye-lid, serve to moisten the Globe of the Eye, and keep its Membranes from growing too dry. In this corner of the

Puncta
Lachry-
malia.
Ib. Fig. vi.

Eye are two small Perforations, which are call'd *Puncta Lachrymalia*, which open and discharge the

the superfluous Moisture of the Eyes into the Nose, through a large excretory Tube.

On the upper part of the Ball of the Eye, near the lesser or external *Canthus*, lies a large Gland call'd *Innominata*, which consists of several small Lobes; each of which sends out a Duct, by some Branches of which the Eye is irrigated, and the overplus of the Humour carried to the greater *Canthus*, and transmitted to the Nose thro' the *Puncta Lachrymalia*. From these Glands proceeds that Humour which forms the Tears.

Glandula
Innomina-
ta.
Ib. Fig. ii.

The Eye is of a Globular Figure, and consists of Membranes, Vessels, and Humours. It is cloath'd in some Parts with Fat, and mov'd by Muscles; which two latter are, by most Anatomists, numbred among the constituent Parts, tho' improperly.

Parts of
the Eye.

To the Eye belong six Muscles, by means of which it enjoys various Motions; of these, four are from their Situation call'd *Recti*, or straight Muscles, coming from several Points of the bottom of the Orbit, and running immediately over the first proper Tunic of the Eye, between that and the *Adnata*. These Muscles have from their several Offices several Names; one being call'd *Attollens*, because it draws the Eye upwards; another *Deprimens*, from pulling it downwards; the third *Adducens*, which draws the Eyes towards the inward *Canthus*; and the fourth *Abducens*, from its forcing towards the outward *Canthus*.

Muscles.
App.
Tab. xvii.
Fig. iv.

Attollens.
Depri-
mens.
Addu-
cens.
Abducens.

Besides these, there are two other Muscles, which are called the Oblique; of which the upper spring from the same Origin with the *Adducens*; from whence tending upwards towards the inward *Canthus* of the Eye, it passes through a Cartilage on the Bone of the Forehead, which is call'd *Trochlea*, and the Muscle itself *Trochlearis*. From this *Trochlea* it is reflected to its Ter-

Obliqui
seu Rota-
tores.

Tab. xviii.
Fig. ii, vi.
Troch-
learis.

mination in the *Tunica Sclerotis*, directly between the Termination of the *Attollens* and the Optick Nerve, which is on the back-part of the Ball of the Eye. When this Muscle acts, that part of the Ball of the Eye, drawn towards the *Trochlea*, whereby the Pupil is directed downwards towards the lesser *Canthus*, and at the same time the whole Ball of the Eye drawn somewhat outwards.

Obliquus
Inferior.

The lower oblique Muscle rises from the external Margin of the lower part of the Orbit near the inward *Canthus*; and from thence running toward the outward *Canthus*, terminates near the other, behind the Termination of the *Abducens*. This draws the Ball of the Eye outwards, and turns its Pupil upward, contrary to the former.

Fat.

Between these Muscles lies the Fat interspers'd, which serves to lubricate and facilitate their Motion.

Tunica
Adnata.
App.
Tab. xvii.
Fig. iv.
H H.

Over all these Muscles is spread a pretty thick white Membrane, which is call'd *Tunica Adnata* or *Conjunctiva*, and makes that which is commonly call'd the White of the Eye.

This Membrane covers the whole Ball of the Eye, except the fore-part, which is call'd the Sight. This is not number'd among the proper Tunicks of the Eye. It is extremely sensible, and abounds with Veins and Arteries, which are very visible in Ophthalmies or Inflammations of the Eyes.

Three
proper.

There are three other Membranes proper to the Eye, of which some Anatomists make five. The first of these is a pretty tough Membrane deriv'd from the *Dura Mater*, which passes to the Eye from the Brain, along with the Optick Nerve, and is from thence propagated over the whole Globe of the Eye, and is on the fore-part, which covers the Sight, transparent, which has
given

Sclerotica.
Ib. Fig. x.

given Anatomists occasion to make two Membranes of it, and to call the transparent part *Cornea*. Cornea.
nea.

The second is deriv'd from the *Pia Mater*, Choroides.
 and transmitted likewise from the Brain, along App. Tab. xvii.
 with the Optick Nerve. This is much thinner and tenderer than the former; and ting'd on the hinder-part with a black Liquor, separated from the Blood Vessels, with which it abounds. The fore-part of this is as the former, transparent, but thinner; and is by Authors reckon'd as another Tunic, and call'd *Uvea*.

Of the Duplication of this part of this Membrane, is form'd that striped variegated Circle which is call'd the *Iris*, which is in several Sub- Uvea.
 jects of different Colours. In its middle is a Per- Iris.
 foration, thro' which appears that little black Ib.
 Speck, which is the Sight, or Pupil of the Eye, Pupilla.
 about which the *Iris* forms a Ring. From the inside of this Membrane spring certain Fibres, which spread themselves round the Crystalline Humour, and serve to contract or dilate the Sight as Occasion requires, and are call'd *Ligamentum* Ligamentum Ciliare.
Ciliare. From the blackness of the hinder part Ibid.
 of the *Tunica Choroides*, the transparent Humours Fig. viii.
 of the Eye derive that seeming blackness which appears in them.

The third Tunic, which some reckon the sixth, Retina.
 (numbring the *Adnata* among them) is the *Retina*, which is only a kind of Net-work Expansion of the Medullary Substance of the Optick Nerve, and is spread only on the bottom of the Eye, opposite to the Sight, and is the proper Organ of Vision.

Between these Coats are contain'd three Hu- Humours of the Eye
 mours: The first of which is called the Aqueous, Aqueous.
 because in its Consistence and Colour it somewhat resembles Water, being almost equally limpid and transparent. This Humour lies immediately under

Ductus
Aquosi
Nuckii.

der the *Cornea*, which it causes to protuberate a little. The learned Dr. *Nuck* (that inquisitive Anatomist) pretends to have discover'd some Ducts which convey this Humour to the inside of this Membrane, which discovery has however been contested. The Author is notwithstanding so ingenuous as to own, that by whatever Inquiries or Experiments he could make, (in which he was usually very happy) he could never trace these Ducts to their Source. Some (who will not allow these Ducts) would have this Humour to be deliver'd immediately from the Arteries, because they cannot find from whence it should come, which is an Opinion contrary to the Method of Nature in other Separations. But if a Conjecture may be allow'd in this Case, believing *Nuck's* Discovery to be real, it is not improbable that these aqueous Ducts are only Branches of the excretory Ducts of the *Glandula Innominata* and *Lachrymalis*, which piercing the Tunicks of the Eye, deliver their Liquor by ways hitherto undiscover'd. This only is certain, that they must have some considerable Source; because, if by any Accident the Tunic of the Eye be wounded, and the Humour runs out, as it readily will; by mere closing of the Eye the Wound is soon heal'd, and the Humour recruited; which cannot naturally be expected from the Arteries, without some intermediate Organ of Separation; which Organ has not yet been elsewhere discover'd.

Crystal-
linus.
App.
Tab. xviii.
Fig. i, ii, iii.

The Crystalline Humour, improperly so called (because it is not fluid) is in Man of a flattish Convex on both sides, approaching to a circular Figure, but a little more Convex on the hinder than the fore-part.

Vitreous.

Next under this lies the *vitreous* Humour, so call'd from the suppos'd Resemblance of melted Glass. The fore-part of this Humour is Concave, occasion'd

occasion'd by the Impression of the CrySTALLINE upon it. On the hinder-part, almost of a spherical Convexity.

Some Authors, finding these Humours covered by Membranes, have given distinct Names to them, and so increas'd the Number of Coats to nine. But these being only Productions of those already mention'd, it is not necessary to perplex the Reader with needless Distinctions.

Behind all these Coats and Humours, thro' a *Optick Nerves.* Perforation of the Skull in the hinder-part of the Orbit, the Optick Nerve enters the Eye; which has been already described: As have likewise the other Nerves, serving for the Motion of the Eye.

It receives Arteries both from the internal and *Arteries,* external *Carotis,* and returns the Blood by Veins *Veins.* that go to the Jugulars.

CH A P. XII.

Of the E A R.

THE E A R is generally divided into exter- *Auricula*
nal and internal. The first of which, *Auris.*
comprehending all that is prominent from the
Head, and the Cavity on the inside of it, is
call'd the Auricle. The inner part, which en- *Tab. xix.*
ters the Skull by a narrow Passage, is in a re- *Fig. i.*
strain'd Sense alone call'd the Ear.

The upper part of the Auricle is call'd *Pinna,* *Pinna.*
and sometimes *Ala.* The whole Extent of the
Auricle outwards is call'd *Helix,* and the inward *Helix.*
Protuberance answering to it is call'd *Anthelix.* *Anthelix.*
The little Protuberance of the side next the
Face is call'd *Tragus;* and the Ridge just above, *Tragus.*
and opposite to it, is *Antitragus;* and the Hol- *Antitra-*
low, surrounded by these, is called *Concha.* These *gus.*
Concha.
are

are Particularities which some Authors have been very exact in, to no great use or purpose.

*Constitu-
ent Parts.*

The Auricle is compos'd of the Cuticle, the Skin, (which in this part is very thin) a Cartilage, a little Fat, a Pair of Muscles and Vessels.

The *Cuticula* has no Difference from that of other Parts. In a *Fœtus* it is continu'd within the *Meatus*, over the *Membrana Tympani*, whence it falls off some time after the Birth; if it remains, it not only hinders the Excretion of the Ear-wax, but occasions Deafness till it's remov'd. An Instance of which I saw in a Girl about eight Years old, who was said to be born deaf, but recover'd her Hearing on the coming away of this Membrane. Its use is in the *Fœtus*, to defend the *Membrana Tympani* from the Contents of the *Amnios*.

Muscles.
Tab. xix.
Fig. i.

The Cartilage is the *Basis* and Support of the whole; and though it be furnish'd with two Pair of Muscles, yet these are in Men so small, that the Auricles are seldom moveable; and that in some of those only who move the whole Scalp.

Attollens.

The superior of these is from its Position, rather than manifest Action, call'd *Attollens*, which in truth is no other than a part of the Muscle of the Scalp, (of which hereafter) with some fleshy Fibres in it, as it descends over the temporal Muscles to the upper part of the *Concha*. Be-

Retrahens.

sides this, Dissection discovers another parcel of fleshy Fibres, which in some Bodies are divided into three distinct Muscles, arising from the *Os Temporale* above its mamillary Process, and are fix'd to the hinder part of the *Concha*. To these a late Author, *Valsalva*, adds another new Muscle, as he affects to call it, springing from the fore-part of the Membrane of the temporal Muscle, and inserted to the fore and upper part of the Ear. But this, and two other Muscles, which he calls *Musculus Tragi*, and *Musculus An-*

titragi,

titragi, seem to be more the Effect of Fancy than any real Existence in Nature. He tells us of a new Ligament of the Auricle, that ties the cartilaginous part of the *Meatus* to the Temple-Bone, near the rise of the *Processus Zygomaticus*. The Blood is sent to these Parts by Branches of the Carotids, and is reconvey'd by the external Jugulars.

The Nerves are of two sorts: The first is from *Nerves*, the hard Portion of the auditory Nerve, marching out by that Perforation in the Skull, call'd *Aquæductus Fallopii*, bestows Branches on the fore-part of the Auricle, and its *Meatus*, before it is spread into the parts of the Face. The second springs from between the first and second *Vertebra* of the Neck; whence descending, it sends a Branch to the Muscles of the Neck, and another to the lower Jaw and parotid Gland; but its main Trunk ascending again, bestows Branches on the back-part of the Auricle, before it passes to the top of the Scalp. This Branch of it goes to the Auricle, and is burnt for the Tooth-ach. *Vid. Tab. xix. Fig. i. H.*

The use of the Auricle is to collect Sounds. *Use of the Auricle.* But whether those Men that have the Faculty of pricking up their Ears, are quicker of Hearing than other Men, I can't determine, tho' it seems probable that they should; and it is observable, that all who have that Faculty have large Auricles.

Behind, and about the Auricles, under the Skin, are situated divers Glands, which from their Place are call'd *Parotides*. Two of which being more considerable than the rest, for their Magnitude are generally understood by that Name. These are Conglomerate, and by divers excretory Vessels, which at last coalesce into one Trunk, discharge their Liquor into the Mouth, at the inside of the Cheek, by the second grinding Tooth.

Tooth. Near these are two other Conglobate Glands, which, being less, are in a manner obscur'd by them.

Alvearium.

Auris.

Meatus Auditorius.

Pili.

Glandulæ Ceruminosæ.

Tab. xix.
Fig. i. R.

Cærumen,
its Use.

The bottom of the *Concha*, or hollow of the Auricle, which is call'd by some *Alvearium*, terminates at the *Meatus Auditorius*, which is the entrance of the *Auris* or Ear, strictly so call'd.

The exterior part of this *Meatus* is Cartilaginous, tho' not so in all parts, especially the upper. This Cartilage is irregularly divided with fleshy membranous Interpositions in several parts of it, not unlike the *Bronchia* in the Lungs, only its fleshy Fibres are here thicker. The inner part, or that which is nearest the Brain, is bony. It is lin'd throughout with a thin Membrane, deriv'd from the Skin, which is continu'd on the *Membrana Tympani*, where it becomes thinner. From the beginning of the *Meatus*, near half way, arise a great number of small Hairs, at whose Roots issues the Ear-Wax, which is entangled in those Hairs, the better to infringe the *Impetus* of the external Air, and prevent its too suddenly rushing in on the *Membrana Tympani*. Under this is a reticular Body, in whose *Arææ* are plac'd the Glands that separate the Ear-Wax.

These Glands are round, and somewhat flatish, and of oval Figures, and have a brighter yellow Colour than the Wax they separate. Their excretory Ducts discharge themselves at the Roots of the Hairs above-mentioned.

The Use of the *Cerumen*, or Ear-Wax, is not only to defend the *Meatus* and *Membrana Tympani* from external Injuries, whether from the outward Air, or other extraneous Bodies; but it prevents any violent *Impetus* in Sounds on the *Membrana Tympani*, as above-noted.

The Course of this *Meatus* is winding, turning sometimes upwards, sometimes downwards, but always bending towards the Face.

This Passage is clos'd inwardly by a thin transparent dry Membrane, stretch'd upon a Bony Circle, and is call'd *Membrana Tympani*, and improperly *Tympanum*. Tympanum, or Membrana Tympani.

This is the immediate Organ of Hearing, and if by any Accident it happens to be broken, Hearing is utterly destroy'd: If by too much Moisture, whether from the Glands, or from Impostemation, or other Chance whatsoever, it is relax'd, the Hearing is vitiated, and becomes defective: As on the other hand, when it is too Tense, (as sometimes in Fevers, and Inflammations of the Ear it happens to be) that Sense becomes acute, even to a Grievance. The Organ of Hearing.

This Membrane divides the External from the Internal *Auris*. Tympani.

The situation of this Membrane, with respect to the erect Posture of the Body, is oblique, facing downwards, whence it is we better hear Sounds that come from below, than those from above: Its external Surface is a little hollow'd in its Middle, by the Handle of the *Malleus*, and consequently its Internal next the Cavity of the *Tympanum* is Convex in its Centre. It's said to be compos'd of two Membranes, which perhaps may be no more than the condition of all other Membranes, *i. e.* consisting of divers *Lamellæ*, that may be divided into two, three or more, as the Part happens to be charg'd with any extravasated Humour. However it's pretended, that one of these Membranes is continu'd from the *Dura Mater*, that passes through the Commissure, between the *Os Temporale* and *Petrosum*. Situs Figura. Tab. xix. Fig. 1. T.

The *Membrana Tympani* has a Perforation that admits of the Passage of Wind, and in some Smoke Foramen Membranae.

Smoke from the *Meatus à Pallato* to the *Tympanum*; This Passage is very small, and runs obliquely from the *Tympanum*, through its Membrane in its upper part, near the Process of the

Tab. xix. *Malleus*: The existence of this Perforation is more evident by the egress of Wind, (when Ulcers affect the *Meatus* by the Patient's stopping his Nose and Mouth, and forcing the Wind by the Ears and in Smokes coming that way) than by any Anatomical Inspection. But in some Subjects it has been seen by blowing into the *Meatus à Palato*.

Veins. The *Membrana Tympani* has Arteries from the *Carotides* and Veins, which empty themselves into the *Diverticulum* of the Internal Jugular. It has a remarkable Branch of a Nerve that passes on its internal Surface between the *Incus* and *Malleus*, which is call'd CHORDA TYMPANI; of the distribution of this Nerve, (which is a Branch of the hard Portion of the Auditory Nerve) we shall speak in the particular Place.

Chorda Tympani.

Meatus Internus. Behind this is a Cavity or hollow of the *Os Petrosum*, by some call'd *Meatus Auditorius Internus*, by others *Concha Interna*, *Tympanum* and *Tympani Cavitas*.

Officula Musculi.

Meatus. In this Cavity are four little Bones, to which belong three Muscles, two *Meatus's* or Passages, and two Apertures call'd *Fenestræ*.

Fenestræ.

Malleolus. The first of these little Bones is call'd *Malleolus*, or the Hammer, consisting of a Head and Handle. The Head being round, is Articulated with the *Incus*; it has two little Processes; that towards the *Tympanum* is short, the other is very long and slender; to the former is fastned a small Muscle, which is call'd *Externus*, and coming from the side of the *Meatus* to the Short Process of the *Malleus* draws the Handle of it downwards, by which the *Tympanum* is relax'd, and thereby prevents

Tab. xix.

Muscles External.

prevents its being broken by the violent concussions of great Noises.

Besides this, the *Malleus* has two other Muscles inserted to it: The first that appears in Dissection is not ill describ'd by Mr. *Du Verney*. After Chizelling off the external Surface of the *Os Petrosum*, you'll find it lying near the external Parts of the bony Channel of the *Ductus à Palato ad Aurem*, whence ascending it enters the *Tympanum* in an oblique Sinuosity immediately above the bony Circle, to which the *Membrana Tympani* is fixt, and is inserted to a very long slender Process of the *Malleus*. Du Verney's Muscle of the Malleus.

The other Muscle of the *Malleus* was discovered long ago, by *Bartholomæus Eustachius*: It lies in a bony Channel of the *Os Petrosum*, which makes one of the *Parietes Tympani*; one part of this Channel is without the *Tympanum*, and lies in the upper part of the bony Passage, that goes from the Ear to the Palate; the other part which is within the *Tympanum* advances as far as the *Fenestra Ovalis*, and makes in that place a rising, on which, as on a Pulley, the Tendon of this Muscle passes to the other side of the *Tympanum*, and is implanted on the hinder or internal part of the Handle of the *Malleus*: Before it enters the *Tympanum*, it is covered with a thick Membranous Sheath: When it acts it pulls the Handle of the *Malleus* towards the cavity of the *Tympanum*, and makes the external Surface of the *Membrana Tympani* somewhat concave; by which the Sounds receiv'd are render'd more acute. Eustachius's.

The next Bone is the *Incus*, which has a small Head, and two Legs, resembling a hollow Grinder or Tooth. The *Basis* or broad Part of this Bone is hollow'd, to receive the head of the *Malleus*: In the middle of which hollow is a small Cavity, wherein is receiv'd the head of the *Malleus* afore-mention'd. It is fastned by the longer Pro- Tab. xix.

Process, or Leg, to the head of the third Bone call'd

Stapes.

Stapes, or the Stirrop, from the resemblance to a Stirrop. This Bone is situated in a small Cavity of the *Meatus*, call'd the *Fenestra Ovalis*, which it closes exactly.

Tab. xix.
Fig. iii.
d, e.

If you examine this Bone with a Microscope, its sides will be found to be hollow'd grooves, and not simple straight Stems, as a Stirrop. Its great Aperture is clos'd with two Membranes, that is, on each side one, so that this whole Bone makes a small flat Drum. 'Tis with great difficulty these Membranes are preserv'd in Human Bodies, in whom they have been seen, and are partly preserv'd by the first Observer Mr. Cowper; but in the *Stapes* of a Calf it is single and less liable to break in taking out the Bone, and is intirely preserv'd by him.

The *Basis* of the *Stapes* is not pervious, tho' its Centre indeed appears lucid when oppos'd to the Light; it is connected to the *Foramen Ovale* by Membranes, in such manner as admits its rising from thence, but is not remov'd far without lacerating those Membranes.

The *Basis* is sometimes found a little convex towards the *Vestibulum* of the Labyrinth and Concave towards its Head, but in other Subjects it is plain.

Musculus
Stapedis.
Fig. iii. f.

The *Stapes* has a peculiar Muscle, call'd *Musculus Stapedis*, the fleshy Belly of which, is contain'd in a Channel in the *Os Petrosum*, laterally placed to the Branch of the hard part of the Auditory Nerve by the Fallopian Aqueduct, whence its Tendon marches out into the Cavity of the *Tympanum*, and descends (with respect to the erect position of the Body) to its termination in the Head of the *Stapes*. When it acts it draws the *Stapes* laterally, and upwards towards the *Fenestra Ovalis*.

The

The next is the *Os Orbiculare* which is a round thin Bone; Concave on one side, and Convex on the other. On the Concave side it receives the Head of the *Stapes*, and the Convex is receiv'd by the Process of the *Incus*.

Os Orbiculare.
Tab. xix.

It has been a general Tradition among Anatomists, that these Bones have no *Periosteum*; but it is certain they are not only furnish'd with Blood-Vessels, but have a very thin transparent Membrane all over them, which is continued on both sides of the *Stapes* as above noted.

Before we proceed to that part of the Organ of Hearing call'd the Labyrinth, we must consider the Cavity of the *Tympanum*. This is much less in human Bodies than in most Quadrupeds, its Figure too varies very much from them. It is a hard matter to reconcile the Symetry of it to any known Cavity: It appears irregular, somewhat arch'd over the *Membrana Tympani*, but it opens into the Sinuosity of the Mammiform Process so irregularly, as nothing but the thing itself, or a Figure of it, can transmit any tolerable Idea of it. *Vid. Tab. xx. in the Appen. Fig. xvi.*

Besides the *Cavernulae* of the Mammiform Processes, there are divers others that also communicate with the *Tympanum*: These may be seen in breaking up the *Os Temporale* to open the *Tympanum* where the *Incus* is lodg'd: These make, as it were, the *Diploe* of the *Os Temporale* in that part, and are irregular Sinuosities. *Val-salva* tells us, by an Injection from the Eustachian Tube, as he calls that between the *Tympanum* and *Fauces*, he has seen the Liquor come into the Cavity of the Skull, and this way he fancies that *Ichor*, Blood, or such like Fluids pass from the Cavities of the Skull into the *Tympanum*.

Other Cavities besides those of the Mammiform Processes.
Meatus ad Palatum.
Tab. xix.

From the Cavity of the *Tympanum* opens likewise another Passage, which terminates in the *Fauces* near the *Uvula*, and admits part of the Air,

Air, which we breathe into it. By this passage it is that Persons who are thick of Hearing are suppos'd to assist that Sense by opening their Mouths, which they are generally observ'd to do when they are attentive to any Discourse.

In the Action of Deglutition, as the *Musculi Pterygostaphilini* draw the *Uvula* upwards and forwards, they also compress the sides of these Tubes, and thereby hinder any part of the masticated Aliment, especially Liquids, from passing into their Orifices in the *Fauces*. It is the Agitation of the sides of these Tubes we hear when we do the Action of Deglutition, tho' we have nothing to swallow.

Cochlea.
Tab. xix.

In the inner part of the Cavity of the *Tympanum* is a little bony Globe, which being broken, discovers that Cavity which is call'd the *Cochlea*, from its spiral windings and tortuosity.

Internal
Mem-
branes of
the Tym-
panum.

The Cavity of the *Tympanum* is lin'd with a curious fine transparent Membrane, adorn'd with Blood-Vessels: All the Sinuosities that communicate with the *Tympanum* are invested with this Membrane; it hangs very loose about the Tendon of the *Musculus Internus* of *Eustachius*, and is very evident on chizelling off the *Os Petrosum* to view the *Tympanum* in a fresh Subject; it is continued on the Surfaces of the *Incus*, *Malleus*, *Os Orbitulare* and *Stapes*; as will appear, if with a magnifying Glass you examine the parts in a fresh Subject; and is also continued with the *Basis* of the *Stapes* to the Surface of the *Foramen Ovale*, and not only hinders the *Stapes* from deserting that *Foramen*, but excludes the Air of the *Tympanum* from the Labyrinth, which comes next to be describ'd.

The Laby-
rinth or
inner Ca-
vity of the
Ear.
Fenestra
Ovalis,
Rotunda.

Besides the openings above-mention'd into the *Tympanum*, there are two others very remarkable. The first of which is clos'd by the *Basis* of the *Stapes*, and from its Figure is call'd *Fenestra Ovalis*;

Ovalis ; the other *Rotunda* ; this latter is clos'd with a transverse transparent Membrane, plac'd a little within the surface of its aperture towards the *Tympanum*. These *Fenestræ* with the whole Tab. xix. Labyrinth (which we are now going to describe) are comprehended in that part of the *Os Temporum*, properly from its hardness call'd *Petrosum*. The Labyrinth according to *Valsalva* may be divided into three parts, *i. e.* The *Vestibulum*, the three Semicircular Channels, and the *Cochlea*.

The *Vestibulum* is a small Cavity of an irregular Form, it is plac'd immediately above the *Basis* of the *Stapes*, between the Semicircular Channels, and the *Cochlea*. In this Cavity appear several *Foramina*, as that of the *Fenestra Ovalis*, the five *Foramina* of the Semicircular Canals, that of the *Cochlea*, besides five others very small, thro' which so many Nerves pass. Vestibulum.

The Semicircular Canals, so call'd from their Figure, make up the second part of the Labyrinth, which *Valsalva* divides into *Semicircularis Major*, *Minor* and *Minimus*. The *Canalis Semicircularis Major* communicates with the *Vestibulum* by two *Foramina*, the one proper, the other common ; the proper lies between the *Foramen* of the *Cochlea* and one of the *Foramina* of the least Canal ; the common is made by the meeting of the *Major* and *Minor* Semicircular Canals. Canalis Semicircularis Major. Fig. i, ii.

The *Semicircularis Minor* (by some call'd the *Minor Superior*) is the second Canal ; that part of it next to the Face is plac'd above the *Vestibulum*, with which it has a double communication, one by the *Commune*, the other by the *Foramen Proprium* ; the *Foramen Commune*, in this, answers exactly to that in the *Major*, but the *Proprium* opens directly above one of the Orifices of the least Canal laterally to the *Fenestra Ovalis*, but directly opposite to the *Foramen* of the *Cochlea*. Minor. Tab. xix.

Minimus.
Fig. i, iii.

The *Canalis Minimus* is plac'd between the two former, and is shorter than either of them. It communicates with the *Vestibulum* by two *Foramina*, one narrow, the other wider; the lesser *Foramen* lies between the *Foramen proprium* & *Commune* of the largest Canal, and looks towards the *Cochleæ Orificium* & *Fenestra Ovalis*; the larger lies under the proper *Foramen* of the *Canalis Minor*, and looks towards the *Fenestra Ovalis* and *Orificium Cochleæ*; this only of the Semicircular Canals has two proper *Foramina*.

Cochlea.
Ib. 5.

The *Cochlea* makes up the third part of the Labyrinth. It lies directly opposite to the Semicircular Canals, and is properly so call'd from the resemblance it has to the Shell that Snails lie in; through its *Parietes* a small Branch of the Auditory Nerve passes. Its Canal is divided by a *Septum*.

Septum.

This *Septum* is compos'd of two Substances, one almost Cartilaginous, the other Membranous. The two Canals that are divided by the *Septum*, are called *Scalæ*; whereof the one, that looks towards the *Tympanum*, by the *Fenestra Rotunda*, is called the *Scala Tympani*, the other has a communication with the *Vestibulum*, just by the *Fenestra Ovalis*, and is called the *Scala Vestibuli*; the first lies uppermost, and is the largest; the last lowermost, and is the least.

Scalæ
Tympani
Vestibuli.

Canalis
Osseus.

The next part, of which *Valsalva* treats, is the *Canalis Osseus* of the Auditory Nerves; which he divides into Common and Particular, because the first contains both Portions of the Auditory Nerves, the latter only the *Portio Mollis*; the *Communis* is the larger, but the *Particularis* is the longer; the *Communis* descends obliquely towards the *Vestibulum*, and at its end is divided into three small turnings, of which one goes towards the *Cochlea*, the other two towards the *Vestibulum*; in one of these last there is a notable *Foramen*,

men,

men, which makes the beginning of the *Canalis Particularis*, call'd *Aquæductus Fallopii*; this is divided into two parts, the shortest of which opens into the Cavity of the Skull, but the other growing larger, is inserted between the *Processus Mamillaris* and *Styliformis*. Through these Canals the two Portions of the Auditory Nerves pass.

*Aquæ-
ductus
Fallopii.*

The *Portio Dura*, after it has come to the *Foramen*, where the *Canalis Particularis* begins, runs two ways; one goes into the Cavity of the Skull and *Dura Mater*, the other, after it has sent some Branches to the *Tympanum*, goes to the *Foramen*, that opens between the *Processus Mamillaris* and *Styliformis*.

*Nervi
Auditorii
Pars Du-
ra.*

The *Portio Mollis*, at the Extremity of the *Canalis Communis*, is divided into two parts, one part of it goes to the Centre of the *Coclea*, the other through the fifth *Foramen* of the *Vestibulum*, which, as soon as it enters, makes the *Membrana Vestibuli*.

From this *Membrana Vestibuli*, some other Membranes proceed, which go clear through the semicircular Canals, by *Valsalva* (from their Figure) call'd *Zonæ*, which he makes the *Sensorium* of Hearing.

T A B. XIX.

F I G. I. From *Valsalva*.

*, THE *Helix* and *Anthelix* of the Ear, looking towards the *Concha*.

A, A Nerve that descends from between the first and second *Vertebra* of the Neck.

B, A Branch of the same Nerve, reflecting upwards towards the Ear.

C, A Branch that goes to the lower Mandible.

D, A Branch that goes to the Muscles of the Neck, cut off at its Origin.

E, Several Branches that spring from C, one of which goes to the Parotid Gland.

F, Branches that proceed from B; a Branch of which likewise goes to the same Parotid.

G, Another Branch of B, which runs on the hinder-part of the Ear.

H, The Place where the Branch G is cauterized to remove the Tooth-ach.

I, A Branch from B, that runs behind the Ear to the upper part of the Head.

K, The *Portio Dura* of the auditory Nerve, passing out from *Fallopian's* Aqueduct.

L, A Branch of the same Portion divided into more.

M M M, Those that go to the Face.

N, Another Branch of that *Portio Dura*, that sends Branches to the lower Mandible.

ooo, A small Branch springing from the same Portion, which, in its tendency towards the upper parts of the Head, look towards the *Meatus Auditorius*, and *Auricula*, on whose fore-part (tho' here not so clearly delineated,) it takes its progress.

P, The Trunk of the external Jugular, by which the Blood returns from the Ear.

Q, The external Branch of the Carotid Artery, which sends the Branches, cut off at its Origin, to the Parotids, r; the Branches (cut off likewise at the same Place) to the back part of the Ear, s. Besides these it sends two

Branches, t t, to the fore-part of the Ear, and in its Progress sends a notable Branch, u, towards the upper parts of the Head.

R, The Glandules of the *Meatus Auditorius*, with its reticular Body.

S. The Continuation of the *Meatus Auditorius*, within the *Processus Mamillaris*.

a, The Fallopian Aqueduct.

b, The beginning of the Eustachian Tube.

c, The cartilaginous back-part of the same Tube.

d, The end of the Tube.

e, The beginning of the *Musculus Pterygostaphilinus*.

f, *Eustachius's* Muscle of the *Malleus*.

1, The largest semicircular Canal.

2, The lesser semicircular Canal.

3, The least semicircular Canal.

4, The *Vestibulum*. In this Position of it, only three of the five *Foramina* (by which the Nerves pass) at first sight appear; a little below these lies a greater *Foramen*, call'd the *Fenestra Rotunda*.

5, The Canal of the *Cochlea*, within whose Circumvolutions appear the little *Foramina* of the Cavity; by which *Foramina* a part of the *Portio Mollis* enters the *Cochlea*; these *Foramina* appear here larger than the Life.



T. Stapes.

V. Musculus Stapedis.

X. Processus longior Incudis.

Y. Manubrium Mallei.

Z. Membrana Tympani a Malleo introrsum elevata.

F I G. II. From the same Author.

SHews the Membrane that Invests the Barrel, *Cochlea*, and the Zones of the semicircular Canals, with a Portion of the soft part of the auditory Nerves of their natural size, and in the same view as the Parts that contained them are represented in the preceding Figure, 1, 2, 3, 4, 5.

a, The Body of the soft auditory Nerve.

F I G. III.

THE *Stapes* magnified with part of its double Membrane, that is extended in its hollow, not unlike the Parchment Rackets now in use to strike shuttlecocks.

a, The Head of the *Stapes*, in which is a shallow Cavity that receives the *Os Orbiculare*, by the mediation of which Bone the *Stapes* is articulated with the long Process of the *Incus*.

b, The *Basis Stapedis*.

c c, Its hollowed sides, to the Margins of which its double Membranes are fix'd, d, e.

d, Part of the Membrane of the external Surface.

e, A Portion of the Membrane of the internal Surface.

f, The fleshy Belly of the *Musculus Stapedis*.

g, Part of the *Os Petrosum*, broke off in freeing the Muscle from its bony Canal.

h, The Tendon of the *Musculus Stapedis*, passing through the part of the *Os Petrosum*, express'd at g, to its Termination in the upper part of the Head of the *Stapes*.

C H A P. XIII.

Of the EXTERNAL PARTS of the FACE.

BEfore we proceed to the Instrument of Taste, it may not be improper to take a View of the EXTERNAL PARTS of the FACE, the Principal of which (not yet describ'd) are the Forehead, Temples, Cheeks, Lips, Chin, and *Buccula*, or double Chin. These all consist, and are made up of the common or universal Integuments

*External
Parts of
the Face
enumerated.*

ments of the whole Body, viz. the Cuticle, Skin, *Membrana Carnosa* and Fat, which, with the Muscles and Glands proper to those Parts, constitute the whole Substance of them.

*Muscles of
the Fore-
head.*

The Forehead has two Muscles, on each side one, which are said to spring from the Skull, near the Coronal Suture; but their Original has been observ'd both by *Fallopious* and *Columbus*, from the Occipital Muscles; or rather that the *Frontales* and *Occipitalis* are one continued Digastrick Muscle on each side, moving the Scalp and Skin of the Fore-head and Eye-brows. That part call'd the *Occipitalis* springs fleshy from part of the *Os Temporale* and *Occipitis*, above the Termination of the *Musculus Mastoideus* and *Cucullaris*; and after a small ascent becomes a thin Tendon, which marches over the whole superior Surface of the *Bregma* and temporal Muscle; where it parts with some fleshy Fibres to the Auricles, and makes the *Attollens Auriculam*; its other part, that covers the temporal Muscle, is thick and tendinous, and is fastned to the *Os Jugale*; and this is what former Anatomists call'd the *Pericranium*, running over the temporal Muscle. The superior Part of this Tendon is exceeding thin, but becomes fleshy after it has pass'd the Coronal Suture, where it has the Name of *Musculus Frontalis*, with Fibres passing obliquely to the Eye-brows, in which it terminates, and in the lower part of the Skin of the Fore-head. It has two Appendages, the Superior or External reaches to the Cartilages, but is most commonly fix'd to the Bone of the Nose: Its inferior Appendage lying under the former, is fix'd to the *Os Frontis* at the Margin of the Orbit next the Nose, and is by *Volcherus Coiter* made a distinct Muscle; by some call'd *Corrugator*, from its use in drawing the Eye-brows to each

each other, which we call frowning, or knitting the Brows.

The Cheeks consisting only of the common Inte- *The Cheeks.*
guments already mention'd, and Muscles contribu-
ting to the Motion of the lower Jaw, we shall re-
fer the Description of them to the Chapter, where-
in we shall treat of the Bones they help to move.

The Lips, besides the common Integuments, *The Lips.*
consist of two Parts; the Exterior hard and mus-
culous; the Interior, soft, spongy, and glandu-
lous, cover'd with a fine Membrane; the fore
and protuberant Parts of which are red, and
call'd by Authors *Prolabia*. Authors have ge- *Prolabia.*
nerally contented themselves to call the Substance
of this part a spongy sort of Flesh; but in reali-
ty it is glandulous, as it manifestly shews itself
to be by the scrophulous and cancrus Tumours
to which it is very subject, and which are pro-
per only to glandulous Parts.

The Muscles, of which the outward Parts of *Muscles.*
the Lips consist, are either common to them with
other Parts, or proper. The common are the
third Pair of the Nose already describ'd, the *Sub-*
cutaneus, to which some add the *Buccinator*.

The *Subcutaneus*, call'd also *Quadratus*, arises *Subcuta-*
with a pretty broad Origine from the hinder part *neus.*
of the Neck, and from the Pectoral Muscle be-
low the Clavicle; and is a thin Membranous
Muscle, running immediately under the Skin. It
adheres firmly to the *Panniculus Carnosus*, from
which it is difficultly separated, and therefore was
not anciently distinguish'd from it, and is inserted
obliquely on each side into the lower Jaw-bone
near the Chin, Lips, and sometimes the bottom
of the Nose, all which parts it draws downwards,
and awry. A Convulsion in either of these
Muscles, draws the Mouth awry on that side
downwards, and is called *Spasmus Cynicus*. It
reaches sometimes to the Ears, which is the reason *Spasmus*
that *Cynicus*.

that some Men have the Faculty of moving them, which others have not, that want this Communication.

Ignorant Surgeons have sometimes, in making transverse Sections upon the Neck, divided this Muscle, which lies close to the Skin, and so have occasion'd the Mouth ever after to be drawn towards the other side.

Buccinator.

The *Buccinator* serves to draw the Lips lengthways, and so to widen the Mouth. It arises from the internal part of the *Processus Coronæ* of the lower Jaw, (where it joins with the *Musculus Pterygopharingæus*,) and from the upper Jaw-bones near the Gums, whence its fleshy Fibres pass directly to the Termination of the Angle of the Lips. The *Ductus Salivalis superior*, from the Parotid Gland, passes through the middle of this Muscle into the Mouth.

Muscles of the Lips.

There are six Pair of Muscles belonging to the Lips, and one single one. Of these, three are peculiar to the upper and under Lip; the other three, and the single Muscle, are common to both Lips.

Attollens Labium Superius.

The peculiar are the *Attollens Labium superius*, *Deprimens Labium inferius*, *Attollens Labium inferius*.

Deprimens Labium inferius.

Attollens Labium superius, springs fleshy from the fourth Bone of the upper Jaw, and expands itself at its Termination on the upper Lip; where it joins with its Partner from the *Septum Narium* to the *Sphincter Labiorum*. The *Deprimens Labium inferius* is plac'd between the *Depressores Labiorum Communes*, on that part call'd the Chin. It appears to be but one Muscle, ascending with a two-fold Order of fleshy Fibres, terminating in the lower Lip. The *Attollens Labium inferius* arises fleshy from the fore-part of the lower Jaw, immediately under the Gums of the *Dentes Incisores*, and descend to their Insertions

Attollens Labium inferius.

ons

ons to the Skin of the lower part of the Chin.

The other three Pair, which are in common, are first the *Zygomaticum*, which has its Origin from the *Processus Jugalis*, and is inserted at the corner of the Mouth, where the Lips are join'd.

Zygomaticum.

This is a pretty fleshy smooth Muscle, and draws both Lips laterally upwards.

The second Pair, which is by some call'd *Depressor Labii superioris*, is however common to both Lips, and arising with a broad Origine from the lower Margin of the under Jaw, by the side of the Chin, is inserted with a narrow Tail into each Lip, near their Coalition, and draws them obliquely downwards.

Depressor Labiorum.

The third common Pair is the *Attollens Labiorum*; it's plac'd between the *Zygomaticus* and *Attollens Labium superius*, it arises from the fourth Bone of the upper Jaw, and terminates at the Angle of the Lips, under the *Zygomaticus*.

Attollens Labiorum.

The last is the Orbicular Muscle, which is more strictly proper to the Lips than any of the rest. Its Fibres make a sort of Ring about the Mouth, and serve to constrict and draw up the Lips. This *Verheyen* contends not to be one Muscle, but a Pair, whose Fibres meet and join at both corners of the Mouth; each acting but upon one Lip only, tho' concurrently. Other Authors are unanimous in calling it one Muscle, and look upon it a *Sphincter*, tho' we think improperly: Because it is not like other *Sphincters* in constant Action, but under the Command of the Will, by which Differences all other *Sphincters* are distinguish'd from other Muscles. But this is a Controversy of no great Moment.

Orbicularis seu Constrictor.

All these Parts are serv'd with Blood by some Branches of the Carotids, which its Veins carry back to the external Jugulars.

Blood-Vessels.

Their

Nerves.

Their Nerves come from the fifth, sixth, and eighth Pair of the Head, as likewise some Twigs from the *Par Accessorum*, which springs from the *Medulla Spinalis*.

C H A P XIV.

Of the INNER PARTS of the MOUTH.

Glandu-
lous Coat.

THE Inner Parts of the MOUTH are the inside of the Cheeks and Lips, the Gums and Palate. All these are lin'd with a glandulous Coat, which is continu'd over the whole inner Surface of the Mouth, and all its Parts, the Teeth excepted. From the Glands of this Coat, thro' innumerable little excretory Ducts, is separated a kind of salival Juice, which serves to keep the Mouth, and all its Parts, moist, smooth, and slippery.

Uvula.

On the hinder part of the Palate, perpendicularly over the *Rima* of the *Larynx*, hangs a round soft smooth Body, like the end of a Child's Finger, form'd from the Duplication of the Membrane of the Palate, which is call'd the *Uvula*, and by some *Columella* and *Gurgulio*, and is moved by two Pair of Muscles, and suspended by as many Ligaments.

Muscles.

Spheno-
staphili-
nus.

These Muscles are call'd the External and Internal: The External is call'd *Sphenostaphilinus*; it descends from a round fleshy Origination, near the Root of a Process of the *Os Sphenoides*, which lies directly between the *Ala Vespertilionis* and *Processus Styloides*, and is implanted into the posterior part of the *Uvula*, where it joins with its Partner. This draws the *Uvula* upwards and backwards, and hinders the masticated Aliment from passing into the *Foramina Narium* in Deglutition.

The

The internal Muscle of the *Uvula* is call'd *Pterygostaphilinus*, and by *Valsalva*, *Novus Tubæ Musculus*, as if it had not been known to former Anatomists; because he says, it belongs to the *Meatus à Palato ad Aures*, which he calls *Tubæ Eustachiana*. Its Origin is near that of the *Sphenostaphilinus*, from the *Os Petrosum*, where the Tube from the Palate enters that Bone, near an acute Process of the *Os Sphenoides*, and the Entrance of the Carotid Artery: Here it is fleshy, and its lower side adheres to the cartilaginous part of the Tube, and does not spring from the whole fore-side of the Tube, as *Valsalva* would have it. Hence it ascends to the *Processus Pterygoides*, where it becomes a broad flat Tendon, which expands itself on the fore-part of the *Uvula*; some of which tendinous Fibres ascend to the lower edge of the *Os Palati*; others descend down the sides of the *Fauces*, where they are lost under the *Amygdalæ*: But the middle Series of this tendinous Expansion, either unites with those of the other side, or is lost in two fleshy Bodies that compose the Body of the *Uvula*.

When this and its Partner act, as they always do together, they not only draw the *Uvula* upwards and forwards, but raise the *Amygdalæ* also; which Action we may observe, when we inspect the *Fauces*. Between the *Uvula* and the Tongue, *Valsalva* tells us of a Muscle, which, altho' small, has a distinct Action, and appears to move the internal glandulous Membrane of the *Fauces*, when we look into these Parts in living People. The same Author makes a distinct Muscle (belonging to the *Uvula*) of a Series of Fibres, mention'd in describing the Muscles of the *Fauces*, Page 63.

Under the Membrane of the Palate are a great Number of pretty conspicuous Glands, scatter'd
in

in the fore-part of it, like Grains of Millet with many Interstices, whose excretory Ducts piercing the Membrane, open into the Mouth: But towards the hinder-part they lie much thicker, and about the Root of the *Uvula* are gather'd and heap'd so close to one another, that they seem to form one pretty large conglomerate Gland, which is therefore call'd by *Verheyen*, *Glandula Conglomerata Palatina*.

Glandula
Palatina
Conglo-
merata.

Gingivæ.

The Gums, which are as it were the Ligaments of the Teeth, are form'd inwardly of a Production of the *Periosteum* of the Jaws, and of the Membrane of the Mouth already describ'd, which being firmly united, and wrapp'd hard about the Roots of the Teeth, hold them fast in their Sockets, as appears by their dropping easily out, when the Gums, by any Accident or Distemper, are eaten away or relax'd, and render'd loose and spongy.

These, with the Bones elsewhere to be spoken of, are the Parts that compose the Mouth: Besides which, there are in and about the Mouth others, though not proper constituent Parts of it, yet are highly serviceable and necessary, and therefore properly to be consider'd in this Place.

Glands.
Parotides.

Of this Number are the Glands, of which the most considerable are the *Parotides*, which have been already describ'd. These, tho' situated behind and below the Ears, yet have their excretory Ducts, which run through the *Buccinatores* to the upper Jaw, and there discharge themselves into the Mouth.

Glandulæ
Maxilla-
res.
Tab. ii.
Fig. ii.
K. K.

The *Glandula Maxillaris* is a considerable Gland, and of the conglomerate sort. It is situate on the inside, under the lower Jaw-Bone, near the *Musculus Digastricus*. It discharges itself by several Branches of Ducts, which form one Trunk that passes under the *Musculus Mylohyoideus*, and meets with that of the other side, within the

Fore-

Fore-Teeth of the lower Jaw, having distinct Orifices with a *Papilla* on each side the *Frænum Linguae*.

The *Sublinguales* are yet less considerable than these, but of the conglomerate kind likewise, and lie underneath the Tongue on each side. Their excretory Ducts are but small, and running parallel with the *Maxillares*, approach each other, and open at several Apertures in the same *Papillæ*, which are scarce discoverable unless the Glands are press'd.

Sublin-
gualæ.
App.
Tab. xxiv.
Fig. viii.

The *Tonsillæ*, vulgarly call'd the Almonds of the Ear, are situated at the Entrance of the *Fauces*, on each side of the *Uvula*, a little below it. They are pretty large conglomerate Glands, having each of them a considerable *Sinus*, which receives a mucous Matter from divers lesser ones, and discharges it into the *Fauces*, to moisten and lubricate them, and perhaps to facilitate Deglutition; because, whenever the Muscles of the *Oesophagus* act, they compress these Glands, and force out a part of their Contents.

Amyg-
dalæ.

From these salival Organs springs all that Liquor we call the Spittle, which flows into the Mouth by the respective Ducts, after its Separation from the Blood in the Bodies of the Glands. As the demand of Spittle is greater in Actions of the lower Jaw, *i. e.* in Mastication, Deglutition, much talking, &c. so the Disposition of these salival Ducts, to favour the Discharge on those Occasions, is very remarkable. Thus the Ducts of the parotid Glands pass close over the *Musculi Masseteres*, and thro' the *Buccinatores*: The salival Ducts of the *Glandulæ Maxillares* pass close under the *Musculus Mylohyoideus*, where the sublingual Glands are plac'd; by this means the Intumescence of the *Musculi Masseteres*, in chewing accelerate the Spittle in the parotid salival Ducts; as the *Musculus Mylohyoideus* does in the

Action

Action of Deglutition, in drawing the *Os Hyoides* upwards. The Agitation of the Cheeks and Lips is sufficient to promote the Discharge from the *Glandulæ Labiales*, and *Buccarum*, mention'd in the beginning of this Chapter, by the Name of the glandulous Coat.

Foramina
Narium.

Behind the *Uvula* is a considerable large Perforation in the Palate, which, at its Orifice next the *Fauces*, is single, but is immediately divided into two, which go to the respective Nostrils, and is each of them capacious enough to admit a Man's little Finger. Through these Holes the Air is admitted and expell'd, when the Mouth is shut.

C H A P. XV.

Of the Os HYOIDES and TONGUE.

THE TONGUE, tho' no proper part of the Mouth, is, however, its great Comfort and Ornament, being the sole Organ of Taste, and the main Instrument of Speech and Deglutition.

Connexion.

It is ty'd to the *Os Hyoides*, to the *Larynx*, and to the *Fauces*, and to the lower parts of the Mouth, by means of the *Frænum*, which is a membranous Ligament running along the lower side of it, in the middle about half way; though sometimes it is extended even to the Tip, and would in such Persons, if not cut, take away all possibility of Speech.

Os Hyoi-
des or Bi-
corne.
App.
Tab. xxiii.
Fig. v, vi.

At the Root of the Tongue is plac'd the *Os Hyoides*, and is, as it were, the *Basis* and Foundation of it. This Bone is so call'd from its imperfect Resemblance of the *Greek Upsilon*; and is compos'd in adult Persons generally of three little Bones,

Bones, and in Children often of five, seven, or more. The middle Bone of the three which is the shortest and broadest is call'd the *Basis*: and the two side Bones the Horns, whence it is called *Bicorne* and *Ceratoides*.

The *Basis* is about a Thumb's breadth long, or *Basis*. somewhat more, on the other side of that Bone which is Convex; and consequently somewhat longer than the inner, which is Concave; it is about half a Finger broad, and thicker in the middle than elsewhere, by reason of a small Pro-tuberance.

The *Cornua* or Horns, are about an Inch and *Cornua*. an half long, and broader at the bottom, than at the Extremities; which are near two Inches asunder.

It has two Cartilaginous Processes call'd *Cornicula*, fastned about the Juncture of its *Cornua*, with its Fore-bone or *Basis*: These *Cornicula* are ty'd to the *Processus Styloides*, by long slender Ligaments, which in some Bodies become bony in divers parts; where you will also very often find an elegant small Muscle, between this *Cornicula* and *Processus Styloides*, besides the *Musculus Styloceratohyoideus* and Ligament above-mention'd. *Processus or Appendices.* *Muscles in some Bodies.*

Its *Basis* lies as it were upon the Head of the *Larynx*, and its Horns are fastned by Ligaments to the upper Processes of the *Cartilago Scutiformis*, and to the *Processus Styloides*. *Situation.*

This Bone is mov'd by five pair of Muscles. *Muscles.* The first pair is call'd *Sternohyoideum*, and arises from the upper and internal part of the Bone of the *Sternum*, and part of the Clavicle, and adjoining part of the first Rib, with a broad *Ori-gine* and running over the *Aspera Arteria*, *Glandulæ Thyroidæ*, and *Cartilago Scutiformis*, terminates in the *Basis* of the *Os Hyoides*: This draws the Bone strait downwards. *Sterno-hyoideum. Tab. xxv. 8.*

Coracohyoides.
Ib. 6.

The second Pair is longer, slenderer and lies deeper. It springs fleshy, from the superior *Costa* of the *Scapula*, not far from the *Processus Coracohyoides*, and terminates in the *Basis* of the *Hyoides*, whence it is call'd *Coracohyoides*. This is a kind of digastric Muscle, having a Tendon in its middle, where it passes between the *Musculus Mastoideus*, and the Vessels that go to the Head. This draws the Bone backwards and downwards.

Mylohyoideum.
App.
xxxix.
Fig. iv. ee.

The third is the *Mylohyoideum*, which is a broad, but short Muscle lying immediately under the *Biventer* Muscle of the Jaw, and springs from the lower Margin on each side of the under Jaw, and is inserted into the *Basis* of the *Hyoides*. It draws the Bone forwards.

Geniohyoideum.
Ib. Fig. v. f.

The fourth is call'd *Geniohyoideum*, and arises likewise from the forepart internally of the under Jaw, and beneath the former, but with a narrower Head; and this goes to the middle of the *Os Hyoides*, and draws it forward and upwards.

Stylohyoideum.
Ib.

The fifth and last Pair, is call'd *Stylohyoideum*, and springs from the *Processus Styloides*, and is inserted into the *Basis* and Horns of the *Os Hyoides*, and draws it laterally upwards.

Tongue.
App.
Tab. xxiii.

The main Bulk and Body of the Tongue, is made up of Muscles, which are cover'd on the upper part with a Papillar Nervous Substance, over which are spread two Membranes.

External Membrane.

The outer of these Membranes is pretty thick, and soft, and full of *Papillæ*, of a Pyramidal Figure, especially towards the Tip; which *Papillæ* stand pointing towards the Root of the Tongue in a bending Posture, which makes their Figure to be *Concavo-convex*. These *Apices* or *Papillæ* are so very Minute and Tender in Men, that they make the Coat appear on the upper part to be Villous; especially as they approach nearer to the Root. The Figure of its *Papillæ* is not in human

human Tongues so plainly discernable to the naked Eye, as not to need the Assistance of a Microscope. In Brutes they are generally larger, stiffer, and more conspicuous, and in some almost Cartilaginous, as may be felt in the Tongues of Cats, Oxen, and especially Lyons, &c. On the under side, a little distance from the Tip, this Membrane becomes thin, smooth, and glabrous; and as it were polish'd by the lower Parts of the Mouth, upon which it slides.

Under this lies a thin, soft, reticular kind of *Inward Coat* punch'd through with innumerable Holes, and always lin'd with a thick white or yellowish *Mucus*. This Membrane is so exceeding tender, and so full of *Mucus*, that it is not examinable by the naked Eye unless boiled, by which it grows tough, and easily separable from the external Membrane, and from the nervous part of the Tongue which lies immediately under it: After boiling it appears like a kind of Gawse, between whose Threads innumerable Holes appear, through which the *Apices* of the Papillary Body underneath it are exerted. This Membrane on the upper side next the outward appears white, with a cast towards yellow, but black on the side next the Tongue.

Many Authors do not allow this as a Membrane, and will have it only to be a *Mucus* hardened by boiling: But since it has so much of the resemblance of a Membrane; and that Authors do agree in allowing two Membranes to the Tongue, I have not scrupled to number it among them, since it does not appear to me that there is any other second Membrane, or Coat of the Tongue in general, reckoning with *Malpighius*, the smooth part under the Tongue, to be part of the outer Membrane.

Immediately under this appears a Nervous Pa-
pillary Body, spreading it self to a pretty thick-
ness

*Corpus
Papillaræ
Nervo-
sum.*

ness over the whole Surface of the Tongue. This Body is on the under side every where level and smooth, except in some few places where it is connected to the subjacent Musculous Part by some Nervous Twigs, which it sends into it.

Papillæ.

The *Papillæ*, which compose this Body, are by the most accurate *Malpighius* (who has been the most curious and successful Observer of this Part) distinguish'd into three sorts, from their different Magnitudes and Figures observ'd by the Microscope; of which those seated on the Sides and Tip are very singular, resembling little round Pyramids, with Globes on their tops, like the Horns of Snails. All these *Papillæ*, which are the immediate Organs of Tasting send their *Apices* or Extremities through the *Mucous Membrane*, into the Pyramidal *Papillæ* of the outward Membrane, which are all hollow to receive them, and seem to be nothing else but a sort of Cases to defend these Nervous *Papillæ* from Injuries, which the Salts and Asperities of those Bodies, which we take into our Mouths, might do them.

Muscles.

The rest of the Body of the Tongue consists of Muscles, which make far the greatest part of it. Authors are not agreed about the number of the Muscles which compose it; some confounding those of the *Os Hyoides* and the Tongue, reckon eight, nine, ten, and more Pair. Some number those proper to the Tongue alone six Pair, others five, others but four, and some will allow no more than three, as real distinct Muscles.

In this perplexity of accounts, which is more confus'd than momentous, I shall follow that, which is the most simple, but most instructive, which is that of our ingenious Countryman Mr. *Cowper*, whose great Skill and Experience in Anatomy is sufficient to warrant his account. He rejects the subdivision of those who unnecessarily multiply

multiply them to six Pair, and in his Book of the Muscles allows but three genuine Pair of Muscles to the Tongue. which are the *Par Genioglossum*, *Ceratoglossum*, *Styloglossum*, nam'd from their Origines and Insertions.

“ The *Genioglossum* lies immediately under the *Genio-*
 “ *Geniohyoideum* before describ'd : They arise *glossum.*
 “ fleshy from the forepart of the lower Jaw in-
 “ ternally, and enlarging themselves, are insert-
 “ ed into the Root of the Tongue ; when these
 “ act, they pull the Tongue forwards, and
 “ thrust it out of the Mouth.

“ The next is call'd *Ceratoglossum*, which has *Cerato-*
 “ a broad fleshy Origination, at the superior part *glossum.*
 “ of the *Os Hyoides* laterally, whence it ascends
 “ to its Insertion at the Root of the Tongue.
 “ This with its Partner acting, draw the Tongue
 “ into the Mouth directly ; if one of them act
 “ only, it moves it on one side.

“ The third is *Styloglossum*, this runs off sharp *Styloglos-*
 “ and fleshy, from the *Processus Styloides* ; whence *sum.*
 “ descending obliquely forwards, it is inserted in-
 “ to the Root of the Tongue, immediately be-
 “ low the implantation of the former. This
 “ pulls the Tongue up in the action of Degluti-
 “ tion, as was before noted.

Mr. *Cowper* mentions the consent of most Authors, except *Fallopious*, in the existence of the *Basioglossum*, and his Thoughts thereupon ; in farther satisfaction of which, he does, upon inquiry, find some Fibres, which by their contrary Order to those of the *Genioglossum*, encourages him to allow the *Basioglossum*, which, together with the foremention'd, makes the Body of the Tongue, and may serve to draw it towards its *Basis*.

Besides these, *Verbeyen* mentions two other Chondro-
 Pair, one very small one, which he calls *Chon-* *glossum.*
droglossum, a very short and narrow pair, which

arise from the Cartilaginous Processes of the Os Hyoides, and meeting in the middle of the Basis of the Tongue are inserted there, forming a kind of Arch under it. This pair has been maintain'd by so many Authors, that 'tis probable it may be found in some subjects, but not constantly nor generally. This liberty of adding, and omitting parts less principal, is frequently taken by Nature, in some of more moment than this pair of Muscles.

Myloglossum.

The sixth pair, mention'd by *Spigelius* under the Name of *Myloglossum*, and which *Verbeyen* doubtingly fancies himself to have seen, is so obscurely describ'd, and stands upon such slender Authority, that it is not worth farther mention.

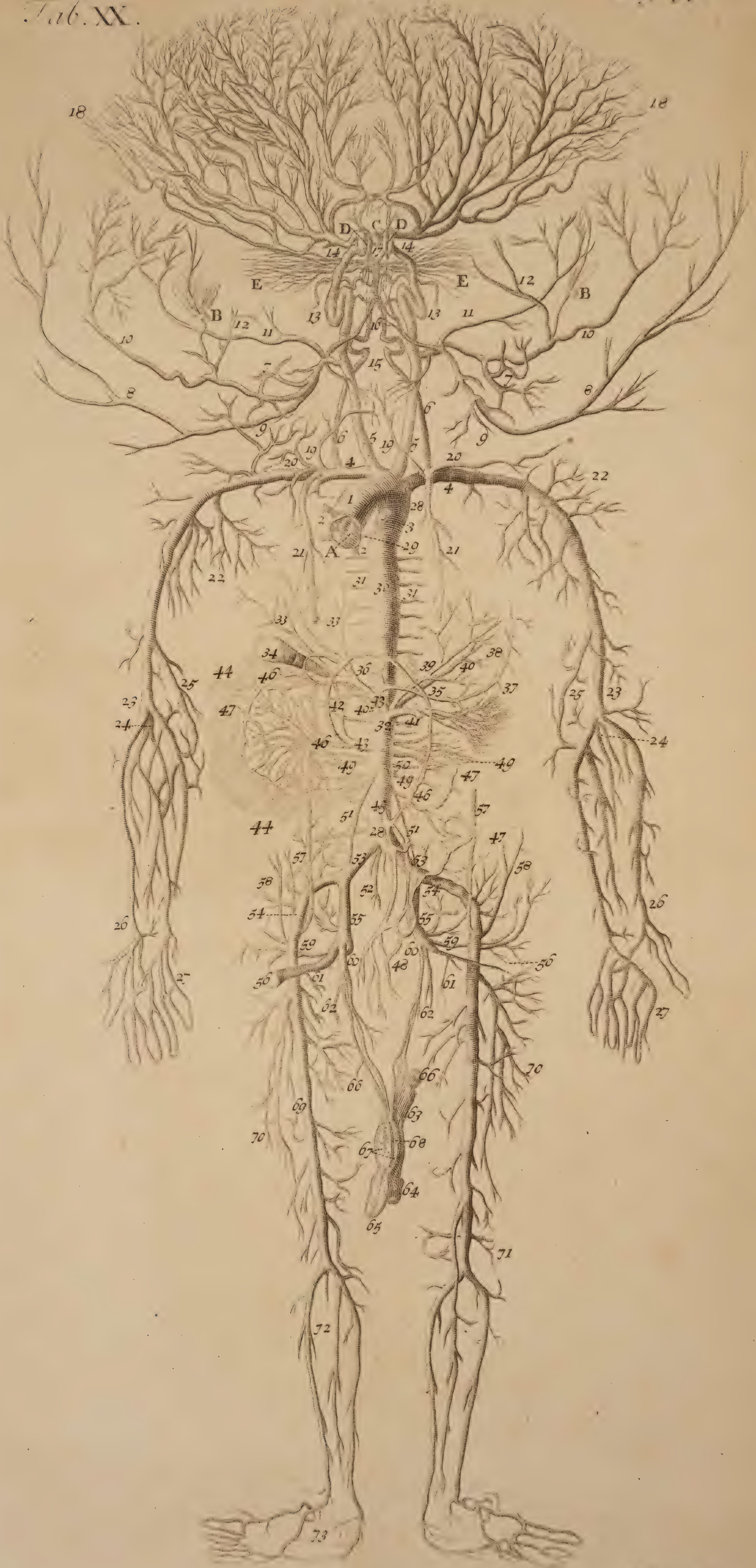
Linea Mediana.

Down the middle of the Tongue, lengthwise, runs a Seam, which divides it to the bottom into two equal parts, but not so effectually but that the Blood-Vessels of one side communicate with those of the other.

Vessels.

These Vessels are Arteries from the *Carotides*, and Veins call'd *Ranulæ*, and are very conspicuous about the *Frænum* under the Tongue, which re-convey the Blood to the external Jugulars. These Veins are frequently open'd in the *Angina*, and is the *Anchora Sacra* of Old Women and the Vulgar in those Cases. The Nerves of the Tongue come from the fifth and sixth and ninth pairs. The two first of which have been call'd *Gustatorii*, and the latter *Motorii Linguae*.

Before we come to the *Artus*, it may not be improper to lay down a Plan of the general distribution of the Blood-Vessels; this seems to be best done by Figures, though some Anatomists have taken a great deal of Pains to very little Satisfaction without. It must be confess'd, Nature is not regular even in the largest Trunks of the Arteries



Arteries and Veins, which has given occasion to some Anatomists of censuring others as incorrect, when in truth it has arisen from the diversity in subjects, as is well known to experienc'd Anatomists. The annex'd Figure of the Arteries you may depend upon as done from the Life. The Trunks of the Veins being less certain than the Arteries, we don't at present think it necessary to add any other Figure of them than what you find in the *Appendix, Tab. iii.* The inquisitive may find a Figure of the Veins lately done from the Life, in the *Philosophical Transactions, N^o. 280.* in the Year, 1702.

T A B. XX.

1. **T**HE *Aorta* or *Arteria Magna* cut from its Origin at the Orifice of the left Ventricle of the Heart.

A, The three semilunary Valves of the *Aorta*, as they appear when they hinder the Blood coming back into the Left Ventricle, when the Heart is in *Diastole*.

2. The Trunk of the great Coronal Artery of the Heart, arising from the beginning of the *Aorta*; the rise of the lesser Coronal Artery not appearing in this position of the *Arteria Magna*.

3. *Ligamentum Arteriosum*.

4, 4. The Subclavian Arteries arising from the *Arteria Magna*, to which the Axillary Arteries, and those of the Arms (23, 23,) are continued.

5, 5, The two *Carotid* Arteries, the right arising from the Subclavian, the left from the *Aorta*.

6, 6, The two Vertebral Arteries arising from the *Subclavicula*, which pass thro' all the Transverse Processes of the *Vertebræ* of the Neck, from whence they are here freed.

7, 7. The Arteries which convey Blood to the lower part of the Face, Tongue, adjacent Muscles, and Glands.

8, 8. The Trunks of the Temporal Arteries springing from the *Carotids*, and giving Branches to the *Parotid* Glands, and to

9, 9. The Neighbouring Muscles, hairy Scalp, and Forehead.

10, 10. Trunks which send Blood to the *Foramina Narium*, particularly the Glands of its *Mucous Membrane*.

11, 11. The Occipital Arteries, whose Trunks pass close by the *Mammiform* Process, and are distributed on the hinder part of the

hairy Scalp, where they are inosculated with the Branches of the Temporal Arteries.

12. Arteries, which carry Blood to the *Fauces*, *Gargareon*, and Muscles of those Parts.

B B, A small portion of the *Basis* of the Skull, that is perforated by the Artery of the *Dura Mater*, here expressed with part of the *Dura Mater* remaining to it.

13, 13. The contorsions of the *Carotid* Arteries, before they pass the *Basis* of the Skull to the Brain.

14, 14. Those parts of the *Carotid* Arteries, where they pass by each side of the *Sella Turcica*, where divers small Branches do arise from them, and help to compose that *Rete Mirabile*, which is more conspicuous in Quadrupeds, than Men.

C. The *Glandula Pituitaria*, taken out of the *Sella Turcica*, lying between the two contorted Trunks of the *Carotid* Arteries, 14, 14.

D D, The *Arteriæ Ophthalmicæ*, which spring from the *Carotids* before they enter the *Pia Mater*.

15. The contorsions of the Vertebral Arteries as they pass the Transverse Processes of the first *Vertebræ* of the Neck, towards the great *Foramen* of the *Os Occipitis*. We have more than once taken notice, that the Cavities of these Arteries, where they are contorted, have been larger than their inferior Trunks, whereby the *Impetus* of the Blood must

necessarily be very much lessened, as well as by their contortions only. In Quadrupeds the Angles of three contorsions of the Arteries of the Brain are more acute, which in them is the more necessary to lessen the force of the Blood at their extremities, by reason of the Horizontal Position of their Trunks.

16. The two Trunks of the Vertebral Arteries, that lie on the *Medulla Oblongata*.

17. The communicant Branches between the *Carotid* and *Cervical* Artery.

18, 18. The ramifications of the Arteries within the Skull; the larger Trunks of which lie between the Lobes of the Brain, and in its *Sulci*. From the extremities of these Arteries of the Brain, are continued its Veins, whose Trunks vary much in their continued Position from the Arteries: They entering the Brain at its *Basis*, and distributing themselves, as above noted; whereas the Trunks of the Veins are extended on the surface of the Brain, and discharge their Blood into the Longitudinal *Sinus*. Nor do the Veins of the Brain accompany their Arteries at their Ingress, as in other Parts: As the Arteries and Veins of the *Dura Mater* do, both which pass thro' the same *Foramen* in the *Basis* of the Skull, B B.

E E, The Arteries of the *Cerebellum*.

19, 19. The

19, 19. The Arteries of the *Larynx*, *Thyroid Glands*, and adjacent Muscles and Parts, arising from the Subclavian Arteries.

20, 20. Others arising near the former, which convey Blood to the Muscles of the Neck and *Scapula*.

21, 21. The *Mammariæ*, which arise also from the Subclavian Arteries, and descend on the Cartilages of the true Ribs internally, about half an Inch distant on each side the *Os Pectoris* or *Sternum*. Some Branches of these pass thro' the Pectoral as well as Intercoastal Muscles, and give Blood to the *Mammæ*, where they meet with some Branches of the Intercoastal Arteries, to which they are inosculated.

These Mammary Arteries joyn with the large Trunks of the *Epigastricks* (57, 57.) also, by which means the *Impetus* of the Blood of the Integuments of the *Abdomen*, is carry'd on with more force; the Extremities of the Intercoastal and Lumbal Arteries also inosculate with each other, as well as these.

22, 22. The Arteries of the Muscles of the *Os Humeri*, and some of those of the *Scapula*.

23, 23. Those Parts of the large Trunks of the Arteries of the Arm, which are liable to be wounded in opening the *Vena Basilica*, or innermost of the three Veins in the bending of the Cubit.

24, 24. The divisions of the Arteries of the Arm below the Flexure of the Cubit.

25, 25. A communicant Branch of an Artery arising from the Trunk of the Artery of the Arm above its flexure at the Cubit, which is inosculated with the Arteries of the Cubit below. In some Subjects you will not find this communicant Branch, as here represented; in whom there are divers smaller Branches of the same kind. By these communicant Branches (of the upper part of the Brachial Artery with those of the Cubit) the Blood still passes, tho' the Trunk (23.) is firmly ty'd, which is done in taking up the Artery, as it's call'd, when 'tis wounded in the case of an *Aneurisma*: Besides firmly tying the Trunk of the Artery above the Place where it is wounded, it is also necessary to tie it in like manner below, lest the Blood, convey'd by the communicant Branches to the inferior Trunk, still pours out at the wound of the Artery from below, in a retrograde manner.

26. The external Artery of the Cubit, which makes the Pulse near the *Carpus*.

27, 27. The Arteries of the Hands and Fingers.

28, 28. The descending Trunk of the *Arteria Magna*.

29. The *Arteria Bronchialis* springing from one
A a 4. of

of the Intercostal Arteries ; it sometimes arises immediately from the descending Trunk of the *Aorta*, at other times from the Superior Intercostal Artery, which springs from the Subclavian. These Bronchial Arteries inosculate with the Pulmonary Arteries, *Vid. Ruysch. Epist. Anatom. 6. Fig. c, c, c.*

30. A small Artery springing from the forepart of the *Aorta Descendens*, passing to the *Gula*. *Ruysch* tells us of Branches of Arteries from the Superior Intercostal, which go to the *Gula*.

31, 31. The Intercostal Arteries on each side the *Arteria Magna Descendens*.

32. The Trunk of the *Arteria Cœliaca*, from whence spring

33, 33. The Hepatic Arteries, and

34. The *Arteria Cystica*, on the Gall-Bladder.

35. *Arteria Coronaria Ventriculi Inferior*.

36. The *Pylorica*.

37. The *Epiploica Dextra, Sinistra*, and *Media*, springing from the *Coronaria*.

38. The Ramifications of the Coronary Artery, which embrace the bottom of the Stomach.

39. *Coronaria Ventriculi Superior*.

40, 40. The Phrenic Arteries, or the two Arteries of the Diaphragm, that of the left side arising from the Trunk of the *Arteria Magna*, the Right springing from the *Cœliaca*.

41. The Trunk of the Splenic Artery, arising from the *Cœliaca*, contorted.

42. Two small Arteries going to the upper part of the *Duodenum* and *Pancreas* ; the rest of the Arteries of the *Pancreas* spring from the Splenic Artery in its Passage to the Spleen.

43. The Trunk of the *Arteria Mesenterica Superior*, turn'd towards the right-side.

44, 44. The Branches of the Superior Mesenteric Artery, freed from the small Guts. Here the various *Anastomoses*, the Branches of this Artery make in the Mesentery before they arrive at the Intestines, may be observed.

45. The Inferior Mesenteric Artery arising from the *Arteria Magna*.

46. A remarkable *Anastomosis* of this Inferior Mesenteric Artery with the Superior.

47, 47. The Branches of the Inferior Mesenteric Artery, as they pass to the *Intestinum Colon*.

48. Those of the *Rectum*.

49, 49. The Emulgent Arteries of the Kidnies.

50. The Vertebral Arteries of the Loins.

51, 51. The Spermatic Arteries, which descend to the *Testes*, and are so small, as to escape being fill'd with Wax.

52. *Arteria Sacra*.

53, 53. *Arteria Iliacæ*.

54, 54.

54, 54. *Rami Iliaci Externi*.

55, 55. *Iliaci Interni*; which are larger in the *Fœtus* proportionably, than in the Adult, by reason of their Conjunction with the two Umbilical Arteries.

56, 56. The two Umbilical Arteries cut off: That of the Right side being drawn as in the *Fœtus*; the Left is exprest as in an Adult.

57, 57. The Epigastrick Arteries, which ascend under the right Muscles of the *Abdomen*, and are inosculated with the *Mammariæ*, as above noted.

58, 58. Branches of the External Iliack Arteries, passing between the two oblique Muscles of the *Abdomen*.

59, 59. Branches of the Internal Iliack Arteries, which convey Blood to the *Extensores* and *Obturatores* Muscles of the Thighs.

60, 60. The Trunks of the Arteries which pass to the *Penis*.

61, 61. The Arteries of the Bladder of Urine.

62, 62. The Internal Arteries of the *Pudendum*, which with those here exprest of the *Penis*, make the Hypogastrick Arteries in Women. The External Arteries of the *Pudendum*, arise from the upper part of

the Crural Artery, which is immediately below the Epigastricks.

63. The *Penis* distended with Wind and dry'd.

64. *Glans Penis*.

65. The upper part, or *Dorsum Penis* cut from the Body of the *Penis*, and raised to shew the *Corpora Cavernosa Penis*.

66, 66. *Corpora Cavernosa Penis* freed from the *Ossa Pubis*, and ty'd after Inflation.

67. The two Arteries of the *Penis*, as they appear injected with Wax, in each Cavernous Body of the *Penis*.

68. The *Capsula*, and *Septum* of the *Corpora Cavernosa Penis*.

69. The Crural Arteries.

70, 70. The Arteries which pass to the Muscles of the Thighs and *Tibiæ*.

71. That part of the Crural Artery that passes the Ham.

72. The three large Trunks of the Arteries of the Leg.

73. The Arteries of the Foot, with their communicating Branch, from their Superior to their Inferior Trunk, as well as their communications at the extremity of each Toe like those of the Fingers.

C H A P. XVI.

Of the BONES in general.

DEsigning to treat of the Parts for local Motion together, it will not be improper, for Method sake, to give some account of what is peculiar to each Species by it self.

I shall begin with the Bones, which are the Frame, and as it were the Timber-work, which sustains the whole Machine ; and in these I shall consider their Membrane, Structure, external and internal, their Contents, and their Connexions with each other.

How a Bone is distinguish'd from other Parts, and what are its Characteristick Marks that appear to Touch and View, has been already told in the initial Chapter of this Work ; where all the general Parts, as well fluid as solid, are in a few Words describ'd. I come now to those things which are more particular.

Periofle-
um.

Every Bone is cloath'd externally with a pretty tough, and extremely sensible Membrane, which covers the whole exterior Surface, and is common to the same upon all Bones of the Body, even the little ones within the *Tympanum* of the Ear not excepted. It is deriv'd from the *Dura Mater*, and consists principally, tho' not wholly, of Fibres drawn from thence, which are rectilineal ; besides which, it receives some other Fibres (but not in equal Proportion to these) from the *Membrana Communis Musculorum*, (or as Dr. *Havers* imagines, from the carnous Fibres of the Belly of the Muscles) which intersect the former variously in different Parts. It is every where thin, tho' not alike so in all Parts. It adheres closely to the Bone, and in some Places is observ'd

to

to send Fibres into the very Substance of it. Its principal Use seems to be to defend the Muscles and Tendons from being fretted in their Action, by Attrition from the hard Substance of the Bones, and to give notice by its sensibility of any thing that might annoy the Bones, which are in themselves insensible.

The external Face of the Bones, which appear upon the removal of this Membrane, has been describ'd among the Parts in general.

The Bones are of two sorts, such as have a notable Cavity within, which is fill'd with a sort of Fat, call'd Marrow, as the Bones of the Arms and Legs, &c. or such as have no such Cavity or Marrow, as the Bones of the Skull and Ribs, &c. *Two sorts of Bones.*

Both these sorts of Bones are laminated, or consist of several *Strata*, or rigid Fibres, which are of the same Substance with the whole aggregate of the Bone, strictly so call'd, of which most are longitudinal, but intersected with cross Bars or Fibres of the same Matter; whence are form'd *Loculi*, or little Cavities, which are fill'd with a sort of Oyl, which serves to keep them from being too brittle and plyable. *Texture.*

This Oyl, which is the thinnest and most fluid part of the Fat, is separated from the Blood, (convey'd by the Arteries thro' peculiar Perforations, made peculiarly for them, which the Veins return after the Separation of the Oyl,) by means of certain little Vesicles lodg'd in these *Cellulæ*, and in this Hollow of the great Bones, which are or do the Office of Glands in this Case. *Oyl, how separated.*

The great Bone of the Arm and Leg have large Cavities within their *Parietes*, fill'd with a peculiar sort of Fat, call'd the *Medulla*, or Marrow of the Bones; which is contain'd in innumerable *Sacculi*, or membranous Bags, which are continu'd to, and open into one another, and make

make the whole appear as one Body or Lump. At each end of these Bones is one or more Perforations, thro' which part of this Fat is discharg'd into the Joynts, of which by and by.

Those Bones which have no such Hollow and Marrow, have however, like these, laminated *Parietes*, tho' not so thick, and between them a sort of spongy cavernulous Substance, which receives from the Vessels, as the others do, a greasy Substance, which serves for their Nourishment and Maintenance.

C H A P XVII.

Of the Connexion of the BONES.

ALL the Bones of the Body (which, tho' differing in number in several Subjects, are however above three hundred in those that have fewest) are joyn'd together, and make one *Compages* or Frame.

The manner likewise of their being joyn'd is various, according to the purposes for which they are put together; some being design'd for Motion, others for Rest, and the support of the incumbent Parts only.

Arthrosis.

That juncture, which is design'd for Motion, is call'd *Arthrosis* or Articulation, and is again divided into two sorts; one, which has a notable and manifest Motion, which is call'd *Diarthrosis*; and the other, which has an obscure one only, and is call'd *Synarthrosis*.

Diarthrosis.
Synarthrosis.

The *Diarthrosis* is again sub-divided into three sorts of Articulation, *Enarthrosis*, *Arthrodia*, and *Ginglymus*.

Enarthrosis.

It is call'd *Enarthrosis*, when a large protuberant Head is inserted into some deep Cavity, which

which is call'd *Cotyle*, or *Acetabulum*, or in *English* a Socket.

Artbrodia, is when a flat Head is receiv'd in a shallow Socket; as in the insertion of the *Os Humeri* into the *Scapula*. Arthro-
dia.

Ginglymus is when a Bone inserts it self into another, and receives a third or the same. Gingly-
mus.

The *Ginglymus*, is again sub-divided into three forts.

The first, is when two Bones mutually receive one another, as those of the *Cubitus* and *Humerus* do, like a Hinge.

The second, is when it receives one Bone, and is receiv'd by another; as the *Vertebræ* do.

The third, is after the manner of an *Axis* of a Wheel in a Box, as the first *Vertebræ* of the Neck, with the second.

The *Synarthrosis*, which has but an obscure Motion, is divided into *Symphysis*, *Sutura*, *Harmonia*, *Gomphosis*, *Syffarcosis*, *Syncondrosis*, *Syneurosis*, *Syntenosis*, *Synymensis*. Synar-
throsis.

That juncture of the Bones, which is for absolute Rest, is call'd *Symphysis*, or Coalition, of which there are likewise three forts. Symphy-
sis.

Raphe or *Sutura*, which is when Bones are joyn'd by uneven Edges, and are as it were indented; or sometimes shooting over each other. Sutura.

The second sort is call'd *Harmonia*, which is when the Bones meet with even Margins in a Line, as those of the upper Jaw. Harmo-
nia.

The third is *Gomphosis*, which is like fixing a Peg or Nail into a Hole, which sort of joynting is proper to the Teeth only. Gompho-
sis.

There are, besides these, five other sorts of Connexions. The first of which is called *Syffarcosis*, which is when the Bone is joyn'd to, or by a fleshy Part, as the *Os Hyoides*. Syffarco-
sis.

Synchondrosis.

The second is *Synchondrosis*, which is by an intermediate Cartilage, as the Ribs are joyn'd to the *Sternum*.

Syneurosis.

The third is *Syneurosis*, which is a Connexion by a Ligament, as is that of the *Os Femoris* to the *Os Ischii*.

Syntenosis.

The fourth is *Syntenosis*, which is joyn'd by a Tendon, as the *Patella* is to the *Tibia*, the *Ossa Sefamoidea*, &c.

Synymensis.

The fifth is *Synymensis*, and is a Conjunction by Membranes; as in new-born Children, the *Ossa Syncipitis* are joyn'd with the occipital and frontal Bones.

Sutura Vera.
Spuria.

The Junctionures are likewise divided by Authors into Genuine and Spurious: The Genuine is that which is indented like the Treth of two Saws, as the *Sutura Caronalis*, and *Lamdoidea*; and the Spurious, is that which shoots over, as the *Sutura Temporalis*.



A NEW
SYSTEM
OF
ANATOMY.

BOOK IV.

CHAP. I.

Of the MUSCLES and Mucilaginous Glands in general.

AS the Bones are the Frame, and the Joynts the Pullies or Hinges on which the Animal Machine moves ; so the Muscles resemble the Chords which draw it to and fro.

The MUSCLES are the Instruments of voluntary Motion, and have been already so far describ'd, as to their distinct Members, as not to need a repetition here. *Muscles, Instruments of Motion.*

The Belly, which is the Part principally affected in the Actions of a Muscle, consists of car-nous Fibres, which are now generally (how true soever) thought to be only Productions of the Arteries and Veins, by the Intumescence of whose *Belly the active Part.*

Contents

Contents the Extremities are drawn nearer together, and by consequence the Bone to which the moveable Part is fix'd, is approximated to the immoveable, or less moveable.

Hypothesis not satisfactory. Many *Hypotheses* have been offer'd to account for this voluntary Motion; but I, who must confess my Ignorance of the means by which the Soul acts upon the Body, cannot acquiesce in any of them, nor pretend to offer any of my own.

Some will have the Animal Spirits the *Primum Movens*; but besides, that their Existence is not to me demonstratively prov'd, the manner of their Action assign'd by Authors is altogether arbitrary and precarious.

Some, after the great Dr. *Willis*, make the Tendons a Receptacle for the Spirits, which are to be rais'd at the Instigation of the Will, and sent into the Body of the Muscle, there to ferment with the Blood, and cause an Intumescence, by some fanciful way or other, they know not how.

Others, who allow no Receptacle for them but the Brains, send them from thence through the Nerves, like Lightning, on all the Errands of the Will; because they cannot allow the Tendons to be a proper Lodgment, upon the account of the Closeness of their Contexture; nor can believe that the Spirits should remain there unactive. But how right soever they may be in their Objection, they offer no more Demonstration for their own Opinion, which is liable to as many Exceptions, were it worth while to amuse the Reader with them.

It is certain from Fact, and ocular Demonstration, that the Belly of the Muscles does swell in its Actions, and that a Ligature laid upon the Artery or Nerve, that serves any Muscle, will totally impede its Action. From whence it is plain,
that

that both of them, some way or other, do contribute to it.

By injection of warm Water through the Arteries, into the Muscles of Bodies after Death, we find that Contractions may be procured; which, besides the Experiments of Ligature, sufficiently shew the share that the Blood has in their actions. But whether in living Bodies this Intumescence of the Muscle proceeds from the extraordinary Quantity of Blood irruent in the time of Action, or from any sudden Expansion of the ordinary Quantity circulating through it, is hard to determine; since either Accident is possible, and the Causes of either equally obscure.

But leaving the active Cause of voluntary Motion to those that are better able to find it out, I shall proceed to the Description of those Parts, which have not been already mentioned in the general Idea of a Muscle, in the first Chapter of this Work.

Besides the common Teguments of the Muscles, each Muscle has a proper Membrane which encloses the whole Muscle, and is more strictly wrapped about the Tendons.

The Body of the Muscle consists of fleshy Fibres, which, according to the late received Opinion, are nothing else but the Capillaries of Arteries and Veins inosculating with, or continued to each other. This Opinion, however receiv'd, appears in my Mind to be justly questionable; since, besides the Membrane which encloses the whole Muscle, there are others (probably Productions of the same Membrane) which divide the Muscle into innumerable *Fasciculi* or bundles of Fibres, which may, for any thing we have been able to trace, be serv'd only with one small Artery and Vein; and this Disposition seems more commodious for the Expansion of the Blood in the Muscle, than its Circulation through conti-

nual Tubes. In which Opinion I am countenanced by the Singularity of that Intumescence, and Detumescence, without Damage, which is proper to the Muscles only ; and not only proper, but necessary to their Action, and to theirs only of all the Parts of the Body.

This makes me think the Observations made by the Microscope, upon the Circulation of the Blood, in the Tails of little Eels, Newts, Tadpoles, &c. no demonstrative Proof of the Continuity of the Vessels in every Part, since it is seen only in the edges and extremities, where the Blood is necessary only for Nutrition, and not in the musculous or moving Parts.

Fat of the Interstices of the Muscles.

In the Interstices of these *Fasciculi* of muscular Fibres are plac'd small Parcels of Fat, scarce perceptible to the naked Eye in a human subject, but visible enough by the help of a Microscope. These were however plainly enough discovered by that accurate Anatomist Dr. *Tyson*, in the Dissection of a Porpess. Their use may reasonably be suppos'd to be the Lubrication of those Muscles, or *Fasciculi* of Fibres, thereby to hinder them from fretting one another.

Mucilaginous Glands of the Muscles.

Besides this Fat, which is contain'd in small Cells or Vesicles, are interspers'd among these *Fasciculi* certain small Glands, which, as Dr. *Havers* has observ'd, afford a smooth mucilaginous Juice, which, together with the Fat, contributes to lubricate these Parts of the Muscles.

Mucilaginous Glands of the Joints.

Besides the Muscles, subservient to the Motion of the Bones, are the mucilaginous Glands, of which there are some in every Articulation. But those at the Articulations, *per Enarthrosin*, are considerable for their Magnitude, and lie at the bottom of the Concave Part of the *Acetabulum*. They are of the conglomerate kind, and as those of the Muscles afford a Mucilage, which mixing with the Oyl issuing from the Cavities of the Bones,

Use.



Bones, thro' the Perforations before mentioned, serves to lubricate, and render the Cartilages more slippery and easy of Motion, as well as to keep them soft.

Besides these Parts instrumental to Motion, are the Ligaments, which have nothing peculiar beyond the Description already given, except their Originations and Insertions, which will be spoken of in their proper Places.

T A B. XXI.

THE fore-part of the
SKELETON of a MAN.

1, The *Os Sincipitis* or
Bregma.

2, The *Os Frontis*.

3, The *Os Temporum* or
Squamosum.

4, The two Bones of the
Nose.

5, The fourth Bone of
the upper Jaw.

6, The first Bone of the
upper Jaw, or Cheek-bone.

7, The *Septum Narium*.

8, The *Processus Mastoi-*
des or *Mammiformis*.

9, ... The *Os Jugale*.

10, 11, 12, The lower
Jaw-bone; 10, that part of
it call'd the Chin; 11, its
Posterior Process, that is ar-
ticulated to the *Os Tempo-*
rum, called *Condylus*; 12, the
anterior Process, called *Co-*
rone.

13, The Bodies of the
two inferior *Vertebrae* of the
Neck; *f g h*, their transverse
Processes.

14, The *Clavicula*.

15, The *Spina Scapula*.

16, The *Processus Coracoi-*
des Scapula.

17, The short Process of
the *Scapula*.

18, 19, 20, 21, 22, 23, The
Os Humeri, or Shoulder-
Bone; 18, that part of it
where the *Deltoides* Muscle
is inserted; 19, its Head that
is articulated with the Shoul-
der-blade; 20, the Asperity
where the *Musculus subscap-*
ularis is inserted; 21, a *Si-*
nus in the upper part of the
Shoulder-bone, that receives
the external tendinous Head
of the *Musculus Biceps*; 22,
the internal Protuberance of
the lower part of the *Os Hu-*
meri, whence the two Mus-
cles bending, the *Carpus*, the
Pronator Radii Teres, *Palma-*
ris, and *Musculus Perforatus*
of the Fingers do arise; 23,
the external Protube-
rance of the last named
Bone, whence the Muscles
extending the *Carpus* and
Fingers arise.

24, 25, The *Radius*; 25,
its Prominence, to which the
large Tendon of the *Muscu-*
lus Biceps is inserted.

26, The *Ulna*.

27, The eight Bones of the *Carpus*.

28, The four Bones of the *Metacarpus*.

29, The three Bones of the Thumb, with their *Ossicula Sesamoidea*.

30, The Bones of the Fingers, compos'd of twelve Bones, of which, three belong to each Finger.

31, The upper part of the *Os Pectoris*, or *Sternum*.

32, The lower part of the *Os Pectoris*, or *Cartilago Ensisiformis*; which is sometimes bifid, as it appeared in the Subject from whence this Figure was drawn.

33, 33, The *Vertebrae* of the Back, or *Thorax*.

34, 34, The *Vertebrae* of the Loins, *i, k, l, m, n, o, p, q, r, s, t, u*. The twelve Ribs.

w, x, y, z, †, The transverse Processes of the *Vertebrae* of the Loins.

35, The *Os Sacrum*.

36, 37, 38, 39, The *Os Innominatum*, by some call'd *Coxendix*; 36, 37, that part of it called *Ilium*; 36, its internal Concave Part; and 37, its Spine; 38, the *Os Pubis*, or *Pectinis*; 39, the *Ischi*, where it is joined to the last named Bone.

40, 40, The great Sinusses of the *Ossa Ilium*, and Circumscription of the *Pelvis Abdominis*.

41, The Foramen of the *Ischium* and *Os Pubis*.

42, 43, 44, 45, 46, 47, The *Os Femoris*, or Thigh-Bone; 43, its Head, which is re-

ceived into the *Acetabulum*, or *Cotyle* of the *Os Innominatum*; 44, the Neck of the Thigh-Bone; 45, the great *Trochanter*; 46, the lesser *Trochanter*, where the *Musculus Psoas* and *Iliacus Intornus* are inserted; 47, the lower and internal Head of the Thigh-Bone, to which the strong Tendon of the *Musculus Triceps* is implanted.

48, The *Mola*, or *Patella*, by some call'd *Rotula*.

49, 50, 51, The *Tibia*; 50, a Prominence on its upper part, where the Tendons of all the extending Muscles of the Leg are inserted; 51, the *Malleolus Internus*.

52, 53, 54, The *Fibula*; 53, 54, its superior and inferior *Appendix*.

55, The *Astragalus*.

56, The *Os Cymbiforme*.

57, The *Os Cuneiforme majus*, seu *Internum*.

58, The *Os Cuneiforme medium*.

59, The *Os Cuneiforme externum*.

60, The *Os Cubiforme*.

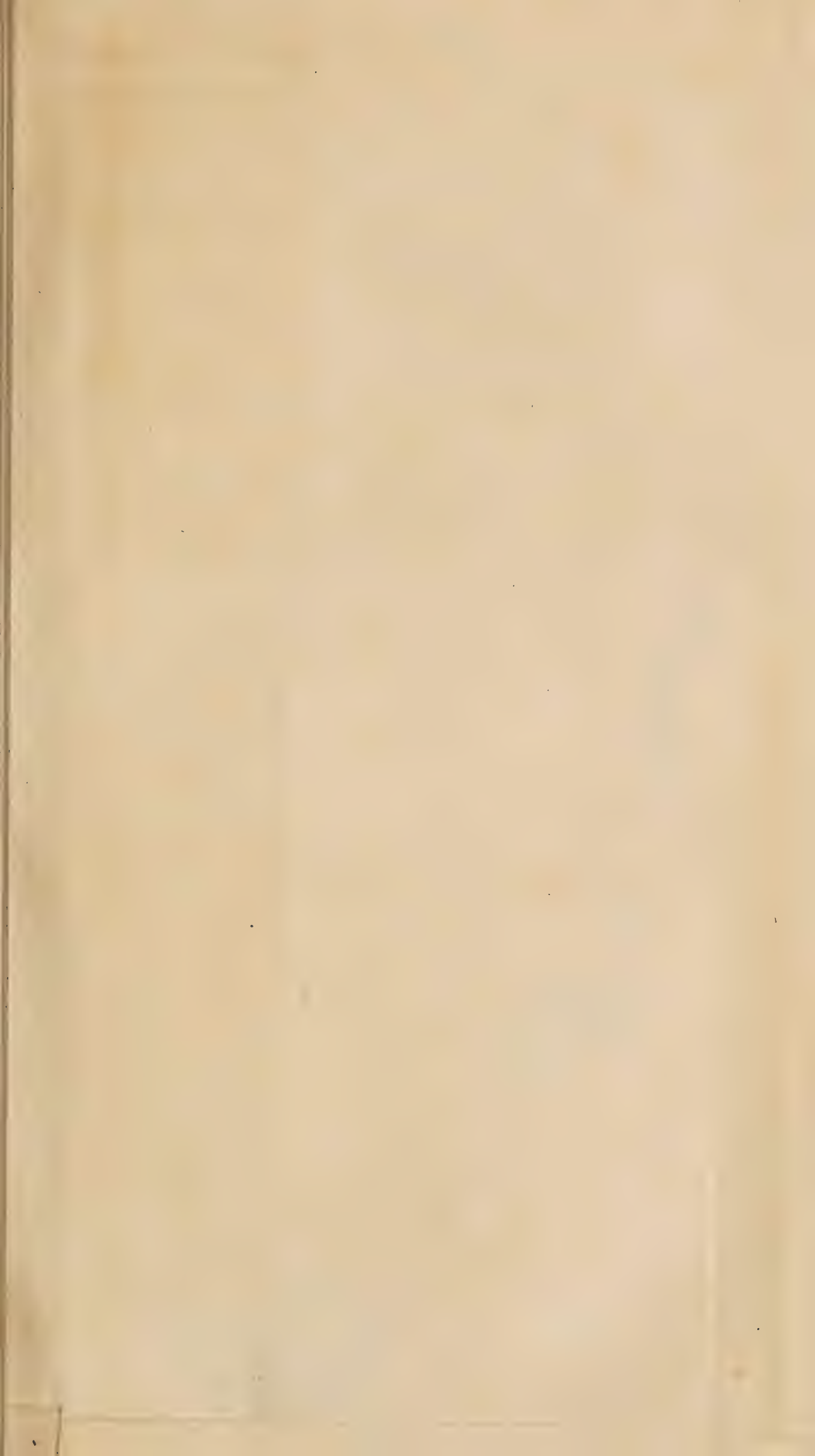
61, Part of the *Os Calcis in situ*.

62, The five Bones of the *Metatarsus*.

63, The two Bones of the great Toe.

64, The twelve Bones of the lesser Toes, of which three compose each Toe.

****, &c. The Appendices of the *Spina Scapulae*, *Os Humeri*, *Radius*, *Ulna*, *Os Femoris*, and *Tibia*.





T A B. XXII.

THE Back and Side of
the SKELETON of a
WOMAN.

- 1, The *Os Sincipitis*.
- 2, The *Os Occipitis*.
- 3, The *Processus Mammi-formis*.
- 4, The *Os Squamosum*.
- 5, Part of the *Os Sphenoides*.
- 6, The *Os Jugale*.
- 7, The first Bone of the upper Jaw.
- 8, Part of the fourth Bone of the upper Jaw.
- 9, 10, The lower Jawbone; 10, the internal Part of it, where the *Musculorum par Geniohyoideum* and *Genioglossum* do arise.
- 11, Part of the *Clavicula*.
- 12, 13, 14, 15, 16, The *Scapula*, or Shoulder-blade; 13, 13, its *Basis*; from 13 to 14, its *Costa inferior*; 14, its *Processus brevis*; 15, Part of the *Processus Coracoides* on the left side, *in situ*; 16, *Spina Scapulæ*.
- 17, 18, 19, 20, 21, The *Os Humeri*; 17, that part of it where the *Musculus Brachialis Externus* begins to arise; 18, the Head of the *Os Humeri*; 19, the Asperity of the *Humerus*, where the *Musculi Supraspinatus*, *Infraspinatus*, and *Teres Minor*, are inserted; 20, the external Protuberance, whence the extending Muscles of the *Carpus* and *Fingers* arise; 21, the internal Protuberance of the *Os Humeri*, where the Muscles, bending

the *Carpus* and *Fingers*, arise.

- 22, The *Radius*.
- 23, 24, The *Ulna*; 24, its superior part, called the *Olecranium* or the Elbow.
- 25, The eight Bones of the *Carpus*.
- 26, The four Bones of the *Metacarpus*.
- 27, The three Bones of the Thumb.
- 28, The Bones of the *Fingers*.
- †, The first *Vertebra* of the Neck, wanting a Spinal Process.
- a, b, c, d, e, f*, The Spinal Processes of the other six *Vertebræ* of the Neck, of which the five Superior are double; between which are placed the *Musculi interspinales Colli*.
- n, n, n, n*, The transverse Processes of the *Vertebræ* of the Neck.
- h, i, k, l, m, n, o, p, q, r, s, t*, The twelve Ribs.
- ooo, &c.* The transverse Processes of the *Vertebræ* of the *Thorax*.
- PPP, &c.* Their Spines.
- RRR, &c.* The Spines of the five *Vertebræ* of the Loins.
- SSS, &c.* The transverse Processes of those *Vertebræ*.
- u, w, x, y, z*, The Bodies of those *Vertebræ*.
- 29, The back-part of the *Os Ilium*, by some called *Dorsum Ilium*.
- 30, The Spine of the *Ilium*.

31, The Protuberance of the *Os Ischium*, whence the Muscles bending the Leg do arise, namely, the *Seminervosus Semimembranosus*, and one of the Heads of the *Biceps*; together with the *Quadratus Femoris*, which latter is an Obturator.

32, An acute Process of the *Ischium*, between which and the last mentioned Protuberance 31, the Tendons of the *Musculus Marsupialis* pass, as on a Pulley.

33, The Internal of the *Os Pubis*.

34, The *Os Sacrum*.

o, The *Os Coccygis*.

✠ The distance between the *Os Sacrum Ilium* and *Pubis* is here remarkable, being much greater in Women than in Men.

35, The large *Sinus* of the *Os Ilium*, wherein the *Musculus Pyriformis* passes to its termination.

36, The great *Foramen* of the *Ischium*.

37, 38, 39, 40, 41, 42, The *Os Femoris*; 37, Its *Linea Aspera*; 38, Its Head that is received into the *Acetabulum* of the *Coxendix*;

39, The Neck of the Thigh-bone; 40, The *Trochanter Major*, to which divers Muscles are inserted; 41, The lesser *Trochanter*; 42, 42, The two Inferior Protuberances of the lower *Appendix* of this Bone.

43, Part of the *Patella in situ*.

44, 45. The *Tibiæ*; 44, that part of the left, where the *Musculus Sartorius*, *Gracilis*, and *Seminervosus*, are inserted.

46, 47, 48, The *Fibula*; 47, 48, Its Superior and Inferior *Appendices*.

49, The *Os Calcis*.

50, The *Astragalus*.

51, The *Os Cuboides*.

52, The three *Ossa Cuneiformia*.

53, The *Os Cuneiforme majus*.

54, The *Os Cymbiforme*.

55, The *Ossa Metatarsi*.

56, The Bones of the Toes.

***, &c. The *Appendices* of the *Spina Scapulæ*, *Os Humeri*, *Radius*, *Ulna*, *Ossa Metacarpi*, *Os Ilium*, *Femoris*, and *Tibia*.

CHAP. II.

Of the BONES and MUSCLES of the HEAD.

Cranium.

THE Head we divide into the Skull and Jaws.

Its Bones.

The Skull consists of eight Bones; six proper, and two common to the upper Jaw, which together,

gether, for that Cavity that contains the Brain.

The first of the Bones proper to the Skull is the Bone of the Forehead, call'd likewise *Coronale*, *Verecundum*, and *Os Puppis*: Its Figure is in a manner circular, and in Children is divided by a Suture, which makes two of it, and is call'd the *Sutura Sagittalis*, which in Adults, generally grows up so as to leave no Marks, tho' sometimes it happens otherwise.

It is join'd to the Bones of the *Sinciput* by the Coronal Suture, which is of the Indentate kind, and one of those which is call'd the true Suture. Below to several Bones of the under Jaw by the *Sutura Transversalis*, and to the *Os Sphenoides* by the Sphenoidal Suture.

It consists of two Tables, betwixt which, just above each Eye-brow, are two Cavities or *Sinus*, which are lin'd on the out-side with a thick double Membrane, furnished plentifully, with Glands and Blood-Vessels, which separate part of that *Mucus* which falls into the Nose into which they open.

It has three considerable Perforations, one inwardly just above the *Septum* of the *Os Cribrosum*, which seems to communicate with the forementioned *Sinus* and the Nose; and two just above the upper part of the Orbit of the Eye, through which the Blood-Vessels pass, and a Branch of the fifth pair of Nerves.

This Bone has four Processes, on each side two, at the corners of the Eyes, forming the upper Orbit of the Eye: Besides which, some reckon two other Prominences towards the Temples.

The Muscles which belong to this Part, are the *Frontales*; which spring from the upper part of this Bone, and serve to raise the Eye-brows, and corrugate the Skin of the Forehead.

Ossa Sincipitis, seu Bregmatis.

But these have been already describ'd among the external Parts of the Face.

Connexion.

The next are the two Bones of the *Sinciput*, call'd likewise *Ossa Parietalia*; which are of an irregular square Figure. They are join'd to the *Os Frontis* by the Coronal Suture, to the Occipital Bone by the Lambdoidal, and to the Temporal by the *Sutura Squamosa*, which is of that kind which is not reckoned genuine; and to each other by the Sagittal Suture: All which, except the *Squamosa*, are in new-born Children open, and close in Process of time. The inside of this Bone has several Furrows, made while it is tender by the Impression of the Blood-Vessels, which run over the *Dura Mater*; which are deepest towards the Temporal Bones, and are in a manner obliterated upon the top of the Head.

Sulci.

Foramina.

They have each a small Perforation near the Sagittal Suture, through which the Blood-Vessels pass to the *Sinus Longitudinalis*.

Os Occipitis, seu Proræ.

The Fourth is the *Os Occipitis* (which though the Bone of the hinder part of the Head is improperly call'd *Os Proræ*, as that of the Forehead is *Os Puppis*) and is of a triangular Figure, and the thickest of the proper Bones of the Head. In new-born Children it is divided into four, but grows up, and becomes one in time.

In Infants four.

Connexion.

It is join'd to the Bones of the *Sinciput* at the Lambdoidal Suture; as likewise to the *Petrosa*, and to the *Os Sphenoides*, at the Sphenoidal Suture.

Sinus duo.

Its Convex part is divided into two large *Sinus* for the reception of the *Hemispheres* of the *Cerebellum*: And two large *Sulci*, or Furrows, in which lie the *Sinus Laterales*.

Sulci.

Foramina.

This Bone has seven Perforations; one of which is very large, for the Egress of the *Medulla Spinalis*, and has on each side of it two little ones,

ones, through two of which enter the Cervical Arteries, and through the other two go out the Nerves, which serve for the Motion of the Tongue: The other two, which are common to this Bone and the *Os Petrosum*, on each side are the outlets of the *Sinus Laterales* and *Par Vagum*.

On each side of the great *Foramen*, is a *Pro. Processus*: cefs lin'd with a Cartilage, which is articulated with the first *Vertebra* of the Neck, and generally a third about the middle of it; though this is sometimes wanting, and in the room of it only a Prominence of the Bone, which, or the *Process* where it is found, receives the Insertions of the Muscles of the Head, of which there are ten Pair.

The first of these is the *Par Splenium*, so cal- *Par Sple-* led, from the resemblance some have imagined it *nium.* to bear to an Ox's Spleen. It arises partly tendinous, partly fleshy, from the Spines of the four Superior *Vertebrae* of the *Thorax*, and from the two lower of the Neck; the former part ascending obliquely, becomes again tendinous at the second, third and fourth Transverse Processes of the Neck, to each of which it has an Insertion: The latter likewise ascends obliquely outwards, and growing fleshy, is inserted into the Bone of the *Occiput*; part of it lying under the Insertion of the *Musculus Mastoideus*.

This, though reckoned amongst the Muscles *Common* proper to the Head, is common to the Neck; *to the* the second or third *Vertebra* of which, they must *Head and* certainly move in their Action; either of them *Neck.* moving separately, draw the Head and Neck *Action.* obliquely backwards, together, they pull it directly back.

The next is the *Par Complexum*, which arises *Par Com-* with six thin small Tendons from the Transverse *plexum.* Processes of the *Vertebrae* of the Neck and *Tho-*
rax,

Action.

max, growing fleshy in its ascent, becomes again Tendinous about the middle, and then again becoming fleshy is inserted laterally into the upper part of the *Os Occipitis*, and the hinder part of the *Processus Mastoides*. These, as the former, acting together, pull the Head backwards, but either of them acting separately, draws it obliquely back.

Par Tertium Fallopii are not always found distinct, but being so in some Bodies it's sufficient only to take notice that they arise with five small flattish Tendons on each side from the first transverse Process of the *Thorax*, and four inferior of the Neck, and becoming fleshy in their ascent, joyn in most Subjects with the upper part of the *Dorsi Longissimus*, and are inserted to the *Os Occipitis* near the Mamillary Processes.

Par Rectum Majus Externum.

Action.

The *Par Rectum Majus* arises Fleshy and Tendinous from the upper part of the double Spines of the second *Vertebra* of the Neck, and spreading in its ascent, is inserted into the posterior Part of the *Os Occipitis*. These Muscles draw the Head directly back upon the first *Vertebra*.

Par Rectum Minus Externum.

Action.

The *Par Rectum Minus* are two small Muscles, arising fleshy from the hinder part of the first *Vertebrae* of the Neck, are inserted into the middle of the *Os Occipitis*. These likewise draw directly backwards.

Par Obliquum superius.

Action.

The *Par obliquum superius*, springs fleshy from the transverse Processes of the second *Vertebrae* of the Neck, and ascending obliquely, is inserted laterally into the *Os Occipitis*. These move the Head backwards upon the first *Vertebra*.

Obliquum Inferius.

The *Obliquum Inferius* rises fleshy from the external Part of the Spine of the second *Vertebra* of the Neck, near the Origination of the *Musculus Rectus Major*, and swelling into a fleshy Belly, runs obliquely to the transverse Process of the

the first *Vertebra*. This has not improperly been *Action.* reckoned among the Muscles of the Neck : However, serving to turn the Head about, most Authors have given them a Place among the Muscles of the Head.

Par Mastoideum is so nam'd from its Insertion *Par Mas-* into the *Processus Mastoides*. It has likewise ano- *toideum.* ther Insertion into the *Os Occipitis*, which gives it a place here. It arises partly tendinous, and partly fleshy, from the upper part of the *Sternum*, and near half the Clavicle, with two (as it were distinct) Originations ; the first ascending somewhat obliquely outwards, joyns with the second, and marching thence directly upwards, makes a round, thick, fleshy Body ; thence passing over the upper part of the *Levator Scapulæ* it spreads again and is inserted into the *Processus Mamillaris* and *Os Occipitis* by the *Splenius*. These Muscles are in a manner Antagonists to *Action.* each other, and serve to draw the Head to either side, as the Acting Muscle is employ'd.

The *Rectum internum majus* (not known by the *Rectum* Name of *majus*, till distinguished by Mr. Cowper, *internum* upon the account of another Pair which he found *majus.* reason to call *Rectum internum minus*) comes from *App.* the fore-part of all the transverse Processes of *Tab. xl.* the *Vertebræ* of the Neck, except the first and *Fig. iii.* second. In its Ascent it becomes fleshy and running over the two upper *Vertebræ*, is inserted into the *Anterior* Process of the *Os Occipitis*, near the great *Foramen*. This draws the Head for- *Action.* ward, and is rightly call'd *Flexor Capitis*.

The *Rectum internum minus*, is a Pair of Mus- *Rectum* cles discover'd by Mr. Cowper, arising from the *internum* forepart of the first *Vertebra* of the Neck, and *minus.* inserted into the forepart of the *Os Occipitis*, immediately under the foregoing. This pair is pro- *Actions.* perly Antagonist to the *Rectum minus*, on the back part of the Neck and Head, and serves to
nod

nod the Head, or draw it forwards and downwards ; and therefore these Muscles are properly enough named by Mr. Cowper, *Annuentes*.

Rectum
Laterale.

The last Pair, which is inserted into the *Os Occipitis* is the *Rectum Laterale* ; which is a short thick fleshy Muscle, rising from the superior part of the Transverse Processes of the first *Vertebra* of the Neck, between the last describ'd and the *Obliquum superius* ; from whence it ascends to that part of the *Os Occipitis*, which is between the *Processus Mamillaris* and *Styloides*. These move the Head laterally towards either Shoulder, acting together, they are Antagonists to one another, and keep it steady.

Action.

Ossa
Tempo-
rum.
Tab. xviii.
Fig. I. D.

The two remaining proper Bones, are those of the Temples ; which are of a Figure near circular. The fore and upper parts of them are very thin, consisting only of one Table ; the lower and hinder parts are thick, hard and uneven. They are joyn'd to the *Os Sincipitis* by the *Sutura Squamosa*, and on the lower part to the *Os Occipitis* and *Sphenoides* ; to which latter, as likewise to the Bones of the upper Jaw, they are joyn'd by means of some Processes, in which part they are call'd *Ossa Petrosa*. Each of these Bones has two *Sinus* ; the exterior of which is lin'd with a Cartilage, and receives the Process of the lower Jaw : The Interior receives the lower part of the *Sinus Laterales* of the *Dura Mater*.

Hence Os
Squamo-
sum.

Ossa Pe-
trofa.
Sinus.

Proces-
sus.

Each of these Bones has four Processes ; three external, and one internal.

Os Ju-
gale.
Tab. ib.

The first uniting with a Process of a Bone of the upper Jaw, makes that bony Arch between the Ear and the Eye, which is called *Zygomaticum*, or *Jugale* ; under which lies the Tendon of the *Musculus Crotaphytes*, where it joyns with the *Masseter*.

The second is a short, round, blunt Process, behind the *Meatus Auditorius*, called from its Figure *Mastoides*, or *Mamillaris*. Processus Mamillaris. Tab. ib.

The third is a long, sharp, slender Process, named likewise from its Form *Styloides*. Some of these Processes have Muscles arising from, or inserted into them, which have been already described. Os Styloides. Tab. ib.

The Internal Process is pretty long and large, containing the whole Internal *Meatus Auditorius*, and Cavity of the *Tympanum*, and is that Part which is peculiarly called the *Os Petrosum*, of whose *Sinus*, Membranes, and other Parts, we have already spoken at large. *Chap. 12. Book III.* Os Petrosum.

From this Bone, the *Crotaphytes*, or Temporal Muscle has in part its Original; but serving for the Motion of the lower Jaw, we shall refer it thither.

The Temporal Bones have seven Perforations; of which four are proper, and three common. These are likewise some of them external, and some internal. Of the first sort is the *Meatus Auditorius externus*, which is pretty large. The second is the *Meatus ad Palatum*, from the Barrel of the Ear to the *Fauces*. The third admits a Branch of the *Carotid Artery* to enter the Skull. The fourth is the Passage for the Auditory Nerve. These four are proper; three external, and the last internal. Foramina. Proper.

The common Perforations are, first a pretty large one between the Process of the *Os Petrosum* and *Os Occipitis*, through which passes the *Lateral Sinus* of the *Dura Meninx*. The second is near the same size between the extremity of the *Os Petrosum* and *Os Sphenoides*, which receives the *Carotid Artery*. The third, which is less, is situated at the side of the former, between the Process of the *Petrosum*, and the greater Process Common.

of the *Basilare*, or *Sphenoides*, through which passes a Branch of the Vein from the *Dura Mater* to the Jugulars.

Bones
common.

The two Bones common to the *Cranium* and upper Jaw, are the *Os Sphenoides*, or *Cuneiforme*, call'd also *Basilare*, and the *Ethmoides*, or *Cribriformum*.

Sphenoi-
des.
Tab. xlix.
Fig. iv. &
iii.

The *Sphenoides* is situated at the bottom or *Basis* of the Skull, from whence, by a barbarous *Latin* Term, it has been called *Basilare*. It is commonly resembled to a Wedge, though the Imagination must be pretty assistant to make out Similitude, it is joined to all the proper Bones of the Skull, though to the *Sinciput* but by a very small *Superficies*. Its Junctionure is called the *Sphenoidal Suture*. On the sides it is, as it were, continued to the *Os Petrosum per Symphysin*.

Processes.

In Infants it consists of four Bones, which in Adults become one; which has several Processes, spread partly over the Palate, and partly over the sides of it. Two of these are broad and thin, like a Bat's Wing, and therefore called *Pterygoides*, and *Alæ Vespertilionum*: And at the lower end two others, incurvated like Hooks, upon which are turned the Tendons of the *Musculi Pterygostaphilini*: Besides which, is a little one on its outside, somewhat resembling the *Crista Galli*, situate in a small Cavity at the farther end of the *Vomer*. There are others called *Clinoides*,

Tab. xviii.
Fig. i.
Pterygo-
ides.

betwixt which is a *Sinus*, which is called *Sella Equina*, and *Turcica*, which contains the *Glandula Pituitaria*, a small Gland into which opens the *Infundibulum*.

Tab. xvii.
Fig. ix.
Sella e-
quina.
Glandula
Pituitaria.
Foramina.
Proper.

This Bone has several Perforations, of which seven on each side are pretty conspicuous: Five proper to this Bone, and two common to the *Os Petrosum*; almost visible on the inside. The first Pair is in the fore-part of it, and affords a Passage for the Optick Nerves: The second are
just

just behind the former, and in the form of a Slit ; which convey the *Motorii Oculorum*, together with a Branch of the *Carotids* to the Eyes, as likewise a Twig of the fifth Pair. The third Pair, which are small, round Perforations, make way likewise for Branches of the fifth Pair of the Nerves : As does likewise the fourth ; which is placed a little lower and forwarder than the former ; and is, as it were, a Continuation of the *Foramen lacerum*, and carries a part of the fifth Pair of Nerves, to the Palate and Teeth of the upper Jaw. The fifth is nearer the *Os Petrosum*, and conducts likewise a Branch of the fifth, with a Twig of the sixth to the Tongue and lower Jaw. Of the two common Pair, the greater *Common.* gives entrance to the *Carotids* ; the lesser lets out a Branch of the internal Jugular.

The other common Bone is the *Ethmoides*, or *Ethmoides* *Cribrosum* ; so call'd, because it is pierced with a great number of small Holes, like a Cullender. *App. Tab. xlix. Fig. iii. -* It is situated in the middle of the *Basis* of the Forehead, and gives passage to the Fibres of the Olfactory Nerve, which are hinder'd from pressing upon one another by a sharp *Apothysis* in the middle of this Bone, call'd *Crista Galli*. *Vid. Chap. 10. Book III.* *Crista Galli.*

C H A P. III.

Of the BONES and MUSCLES of the JAWS.

THE Jaws are constantly divided into the Upper and Under, from which most of the Muscles spring which make the external part of the Face.

The upper Jaw is immoveable, but with the Maxilla whole Head, and consists of eleven Bones pro- *Superior. Tab. xviii. Fig. i.* per, joyn'd to each other *per Harmoniam*. The *Bones Os Jugale.*

Bones of the first Pair are of a Figure betwixt square and triangular, an irregular squarè approaching to a Triangle. These make on each side part of the lower Orbit of the Eye, particularly the external *Canthus*; and send out those Processes that make part of the *Os Jugale*, from whence some have call'd this Bone itself *Zygoma*.

Tab. ib.

The second is a small thin Bone, very brittle, and almost pellucid, and therefore seldom to be found in Skulls that have been buried. This makes the inward *Canthus* of the Eye, through which is a Passage to the Nose called *Punctum Lachrymale*. Whether this properly belongs to the Jaw or not, we leave to those that love such Speculations.

Foramen
Lachry-
male.

Third
Pair.

The third Pair are likewise very thin, and are those which make the Bones of the Nose.
P. 307.

Os Malæ.

The fourth Pair is the largest of the upper Jaw: They make a great part of the lower Orbit of the Eye, and of the Palate, and contain the upper Teeth; for the reception of which, there are Hollows or Sockets, answering in number to the Teeth. Its Cavity, called *Antrum Maxillæ Superioris*, is mentioned in the Description of the Cavities of the Nose, *Chap. 10. Book III.*

Fifth
Pair.

The fifth Pair is situate at the bottom of the Palate, where the great Perforation is from the Nose. Upon these the Palate is spread, and therefore they are properly called Bones of the Palate. These are thin Bones, but very hard and solid.

Vomer.

The eleventh and last Bone is the *Vomer*, or Ploughshare; which rising from the upper part of the inside of the Palate, divides the Nose lengthways, and is therefore called the Bridge of the Nose: In which, and the Parietal Bones of the Nose, a *Caries* sometimes happens, which occasions

occasions that which we call the Falling of the Nose; which sometimes likewise affecting the Muscles that cover them, occasions the loss of the Tip, or half the Nose.

Under the Bones of the Palate, run the *Musculi Pterygopalatini*; which have been already describ'd. Musculi Pterygopalatini.

To the upper Jaw are fixt sixteen Teeth, of which hereafter.

The lower Jaw, in Children, consists of two Bones, which in Adults unite so firmly together, as to seem but one. In Children their Junctionure is *per Synchondrosin*, by a Cartilage intermediate at the Chin and fore-part of the Jaw; which Cartilage afterwards becoming Osseous, makes it a Junctionure *per Symphysin Harmonicam* so close, as if they were glu'd together, and so united, bear somewhat of the Figure of the Greek Letter *v*. The lower Jaw. App. Tab. xlix. Fig. i.

It is a thick, hard Bone, consisting of two Tables; betwixt is a spongy Substance, which in Children is Medullous. The fore-part is shallow, just sufficient to afford Sockets for the Teeth; the hinder is deep, and has on each side two Processes, which are called *Cornua*, shooting upwards. The foremost of which is called *Corone*, and receives the Tendon of the Temporal Muscle: The hinder is nam'd *Condylodes*, and is guarded with a Cartilage. It is articulated with that part of the Temporal Bone, which is called *Petrosum*; upon which, as a Hinge, the lower Jaw moves, by the mediation of a moveable Cartilage, placed in this Articulation. Substance. Processes. Corone. Condylodes. App. Tab. xlix. Fig. i. X.Y.

It has four Perforations, on each side two; one on the outside, which is the hinder and largest near the Processes, which receives a pretty large Branch of the fifth Pair of Nerves together with an Artery and Vein, which running the whole length of the Jaw, send a Twig to each Tooth. In the fore-part is another, by

which the same Vessels come out again, and are dispers'd into the Lips, and its Muscles and Skin.

Teeth. In this Jaw, as in the upper, are sixteen Teeth ; which in either Jaw are fixt in peculiar Sockets, by that sort of Juncture which is called *Gomphosis*, by Joyners call'd Pegging, upon the account of the Gums, which serve to fix them in these Sockets : They may likewise be reckon'd to joyn as *per Syssarcosin*.

Alveoli.
*How fast-
ned.*
*How
loosened.* This use of the Gums appears most plain in Morbid Cases, such as Scorbutical ; in which when the Gums grow big and spongy, the Teeth are very apt to fall out : As they are likewise in artificial *Ptyalism* ; when, by the too great Flux of Humours thro' those Parts, their Substance is relaxt, and generally by the acrimony of the Humours or Medicines ulcerated : Perhaps in those Cases the extraordinary afflux of Humours may soften and dilate the Sockets. But upon what occasion soever it be, that the Gums either desert the Teeth, or become over-lax or spongy, the Teeth themselves are found to stand but very loosely, and subject to be turn'd out of their Sockets by any little Accident.

*Mem-
brane.* The Sockets, in which the Teeth are placed, are lined with a Membrane of exquisite Sense, which seems to be nervous, and is wrapt about the Roots of each Tooth : From whence, and the Nerve, proceeds that Pain which is call'd the Tooth-ach ; the Teeth themselves being altogether insensible.

Substance. The Teeth are the hardest and most polish'd Bones of the whole Body, without any *Periosteum* in the prominent part ; approaching in Consistence and Splendor to Ivory, which is the Tooth of an Elephant.

Number. They are ordinarily sixteen in each Jaw ; tho' the number may be sometimes less in those that have lost none. The

The Teeth are of three sorts: Those in the fore-part of each Jaw are called *Incisores*, and ordinarily four in number in each Jaw, which are broad, thin, and sharp: Behind which, on each side of each Jaw, stand two, which are a little more prominent and pointed, and call'd *Canini*: Behind these are five in a row, on each side of each Jaw, which have a broad, flat Superficies, and are call'd *Molares*, or Grinders: These, in Men, are the Teeth of most Importance, as serving chiefly for Mastication; tho' other carnivorous Animals, which live by Prey, and do not chew their meat long, have more occasion for the *Canini* and *Incisores*.

Sorts,

Incisores.

Canini.

Molares.

App.

Tab. xlix.

Fig. i.

The *Incisores* have generally but a single Root; the *Canini* sometimes a double one; the *Molares* being put to greater Stress and Service, have sometimes three, and sometimes four, especially the hinder; which being nearer the *Vice* or Hinge of the Jaw, are put to greater Service. These being in Men most employ'd, are the first generally that decay.

Root.

The Jaws are seldom fully furnish'd with them till about three Years of Age, tho' the time of their Eruption be very uncertain and irregular.

Time of breeding.

The first that appear are the *Incisores*; which begin to shew themselves frequently at seven or eight Months, and sometimes much earlier. Some indeed have been born with all their Teeth, which is look'd upon as a monstrous Case.

Incisores.

The *Canini*, which are by the Women call'd the Eye-Teeth, appear somewhat later. And last of all, the *Molares*; which do not usually come all at a time, and often with such Difficulty and Pain, that if their Eruption be not carefully watch'd and assisted, it costs the Infant's Life.

Molares.

No Accident to which they are subject costs the Life of more Children than Dentition; the

Danger in Dentition.

Pain, and other Attendants of which, frequently throw them into Epileptick Fits, which sometimes carry them off almost in an instant. Dentition ought therefore to be carefully watch'd, and not trusted to the sole Security of whetting the Gums with a bit of Coral, or foolish, superstitious Amulets, such as *Pæony* Roots, or the like; but whenever the Gum appears to be swell'd and painful, the Eruption of the Tooth should be facilitated by opening of it with a Lancet, or some more proper Instrument, such as is now in use for that purpose: In the use of which, care should be taken to reach the Tooth it self, that the Membrane immediately covering it (from which the Pain principally arises) may certainly be divided, and the Gum not superficially only wounded, as it generally is when old Women undertake this Operation with their *Harry* Groats. This alone is not sufficient in difficult Dentition, which is usually attended with a Fever, and a Superfluity of Humour, and frequently a *Diarrhæa*. But the Direction in such Cases belongs to Practice, and must be left to skilful Physicians, who will know whether Evacuation by Stool (as it often is) be necessary, or any other method.

Change.

Ordinarily at the Age of seven, eight, or nine Years, the first Set of Teeth are thrust out by a race of Successors, which (the way being already made for them) come out easier; tho' sometimes, when they come at an Age more advanced (as they will now and then) they do it with Pain and Difficulty; because the Head of the Tooth being broader than the Roots of that which stands over it, the Membrane, which was conform'd to the Figure of the former, is extraordinarily distended, which always produces Pain.

Decay.

The time of their Decay is uncertain; but generally in Age they fall out, either by their own Corruption, (which they are very liable to, as
appears

appears by their frequent growing hollow) or by the Defects of the Gums, or the Sockets. Diseases, and other Accidents, often pull them out in younger Heads, especially Mercurial Salivations.

The Vessels which go to and from the Teeth, *Vessels.* are Nerves from the fifth Pair, Arteries from the *Carotids*, and Veins which go to the external Jugular; all which run along the hollow of the *Maxilla inferior*.

To this lower Jaw, which only is moveable, *Muscles of the lower Jaw.* (the upper Jaw having none but what is common to the whole Head) belong five Pair of Muscles.

The first of which is the *Crotaphytes*, or temporal. Its Fibres spring severally from the Bones *Crotaphytes.* of the Forehead, the *Sinciput*, the *Sphenoides*, *Tab. xxiii.* and temporal; which meeting, and as it were centring under the *Os Jugale*, from whence also this Muscle receives some Fibres, they proceed to the *Processus Coronæ*, into which they are inserted, and draw the lower Jaw upwards. *Action.*

The *Masseter* is partly continued from the former, and springs fleshy and tendinous, from the first Bone of the upper Jaw, and backwards from the *Os Jugale*: Its Fibres decussating each other in acute Angles, descend to the inferior Edge of the outside of the lower Jaw, and assist the former in drawing up the Jaw. *Masseter. Tab. ib.*

The next is the *Digastrick*, so called from its *Biventer,* having two *Venters*, or Bellies. It rises fleshy *or Diga-* from a Furrow at the side of the *Processus Mastoides*, whence, in its Descent through the *Sty-* *lohyoideus*, and an annular Ligament of the *Os Hyoides*, it becomes tendinous. From this Bone arise some Fibres which join its second Belly, where it grows again fleshy, and returning upwards, is inserted into the middle of the inferior part of the lower Jaw. By this Contrivance, its *Action.*

middle Tendon, which passes through the circular Ligament of the *Os Hyoides*, is seated lower than either its Origination or Insertion, and by that means it is enabled to draw the Jaw downwards, which otherwise it had been impossible for it to have done.

Pterygoideus internus.

The *Pterygoideus internus* arises partly fleshy, partly tendinous, from the *Processus Pterygoides* of the *Os Sphenoides*, and is inserted at the bottom of the lower Jaw, on its inside, opposite to the *Masseter*. These Muscles acting severally, draw the Jaw to one side; but together, they assist the *Masseter* and *Crotaphytes* in the Action of Mastication.

Action.

Pterygoideus externus.

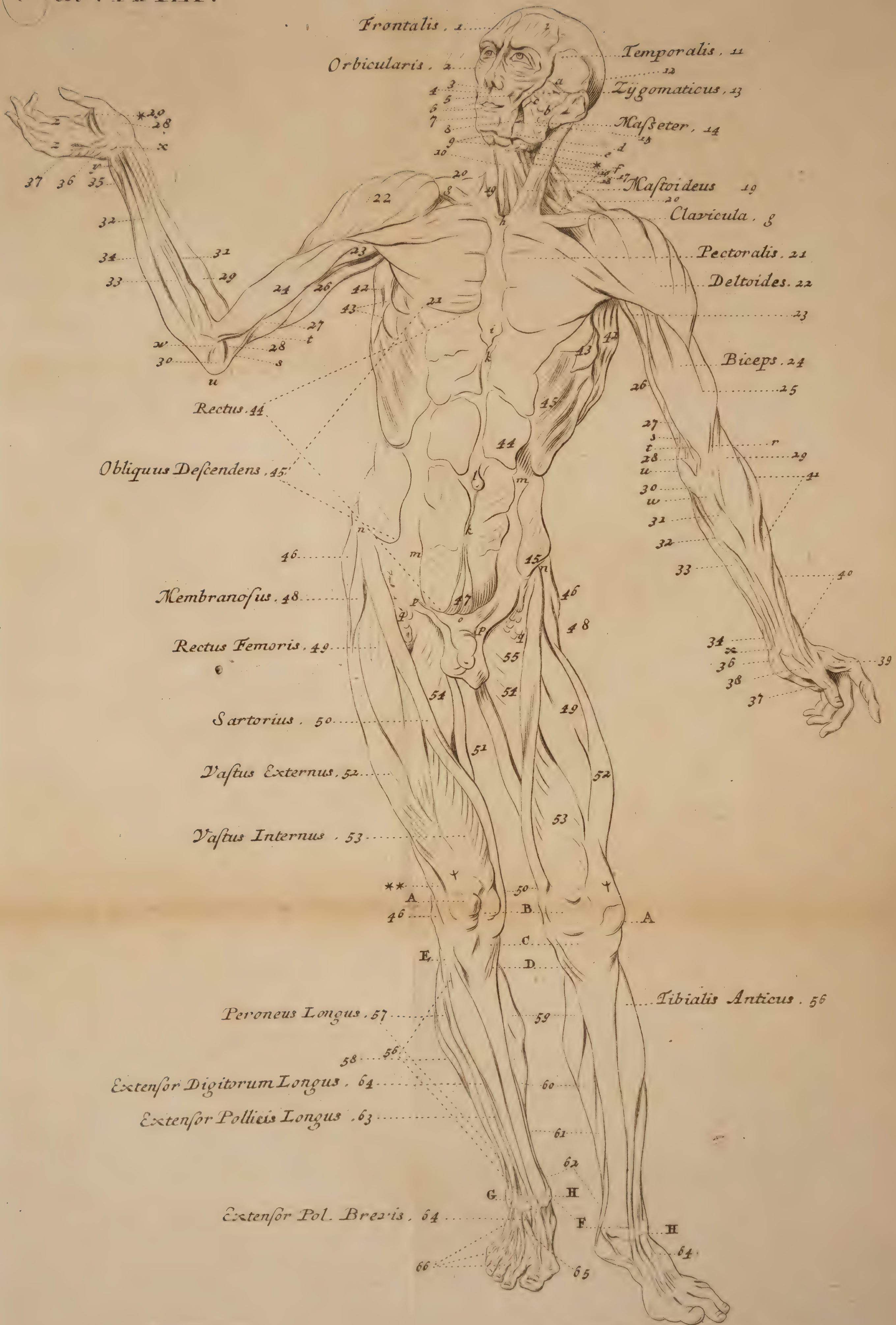
The *Pterygoideus externus* arises from the external part of the same *Processus Pterygoides*, and from the superior part of the *Os Sphenoides*, near its Commissure with the Bone of the Temple, and running backwards, is inserted into the *Processus Condylodes* of the lower Jaw. This Muscle draws the Jaw forward, and makes the lower Jaw shoot beyond the upper.

Action.

Quadratus genæ.

Besides these, which are proper to the lower Jaw, the *Quadratus Genæ*, which is a broad, square Muscle, lying under the Skin of the Neck, arises thin and Membranous from the Spines of the *Vertebræ* of the Neck, and from the Skin of the superior part of the *Cucullaris*, and pectoral Muscle: From whence ascending under the Skin of the Neck, it becomes fleshy, and is inserted partly into the *Os Hyoides*, and partly into the middle of the under edge of the lower Jaw, and has been already describ'd under the Name of the *Subcutaneus*. Book III. Chap. xiii.





T A B. XXIII.

1, **T**HE *Musculus Frontalis*.

2, The *Orbicularis Palpebrarum*.

3, The *Elevator Labii superioris*, and *Dilatator Alæ Nasi*.

4, The *Elevator Labii superioris proprius*.

5, The *Elevator Labiorum*.

6, The *Orbicularis, seu Sphincter Labiorum*.

7, *Depressor Labii inferioris proprius*.

8, *Depressor Labiorum communis*.

9, The two Extremities of the *Digastrici*, near their Insertions to the lower Mandible.

10, The *Sternohyoideus*.

11, The *Temporalis*.

12, The *Elevator Auriculæ*.

13, The *Zygomaticus*.

14, The *Masseter*.

15, Part of the *Buccinator*.

16, The *Coracohyoideus*.

17, Part of the *Elevator Scapulæ*.

18 Part of the *Scaleni*.

19, The *Mastoideus*.

a, The *Os Jugale*.

b, The *Parotid Gland*.

c, Its Salival Duct.

d, The lower Jaw-Bone bared.

e, The inferior Maxillar Gland.

*, Part of the *Os Hyoides*.

f, A considerable Branch of the *Carotid Artery*, *vid.*

App. Tab. XXXIX. Fig. iv. not letter'd.

g, The *Clavicula*.

h, The upper part of the *Os Pectoris*, or *Sternum*, where the *Claviculæ* are articulated.

i, The *Cartilago Ensiformis* at the lower part of the *Sternum*.

k, k, The *Linea Alba*.

l, The Navel.

m, The *Linea semilunaris*, or meeting of the Tendons of the two oblique Muscles, before they pass over the *Rectus*.

n, The Spine of the *Os Ilium*.

o, The *Os Pubis*.

p, The Process of the *Perritonæum*, inclosing the spermatick Vessels.

q, The *Glandula Inguinalis*.

r, The Trunk of a Nerve, marching by the *Musculus Biceps*, which I have known wounded by an ignorant Blood-letting, in opening the middle Vein of the Arm.

s, The Trunk of a Nerve, passing immediately behind the internal Protuberance of the *Os Humeri*, by pressing of which a great Pain is caus'd.

t, The Trunk of the Axillary Artery, descending under the *Fascia Tendinosa* to the Cubit, where it is sometimes wounded by bold Blood-letters.

u, The internal Protuberance of the *Os Humeri*.

w, The *Fascia Tendinosa*.

x, The *Ligamentum Annulare* of the *Carpus*.

y, The Extremity of the *Ulna* next the *Carpus*.

zz, The tendinous Expansion of the *Palmaris* in the Palm.

Ƴ Ƴ, The Tendon of all the extending Muscles of the *Tibia*, above the *Patella*.

A, The *Patella*.

** , The Tendon of the *Musculus communis Membranosus*, near its Implantation to the *Fibula*.

B, The internal lower Protuberances of the Thigh-bones.

C, The superior Appendages of the *Tibia*.

D, The Terminations of the Tendons of *Sartorius gracilis*, and *Seminervosus*.

E, The upper Appendix of the *Fibula*.

F, The *Malleoli interni*, or lower Appendages of the *Tibiæ*.

G, The *Malleolus externus*, or lower Appendix of the *Fibula*.

H, The *Ligamentum transversale pedis*.

N. B. If any of the same Parts are referr'd to by the like Characters in any of the succeeding Figures, let these be their Explication.

20, Part of the *Cucullaris*.

21, The *Pectoralis*.

22, The *Deltoides*.

23, Part of the *Coracobrachialis*.

24, The *Biceps*.

25, The *Brachæus exter-*

nus in the left Arm.

26, Part of the *Gemellus*.

27, The *Brachæus internus*.

28, The *Brachæus externus* in the right Arm.

29, The *Supinator Radii longus*.

30, The *Pronator Radii Teres*.

31, *Flexor Carpi Radialis*.

32, *Palmaris longus*.

33, *Flexor secundi inter-nodii Digitorum perforatus*.

34, *Flexor Carpi Ulnaris*.

35, Part of the *Extensor Carpi Ulnaris*, in the right Arm.

36, *Palmaris brevis*.

37, *Abductor minimi Digiti*.

38, *Abductor pollicis*.

39, *Abductor indicis*.

*, 39, *Flexor secundi Ossis pollicis*.

40, *Extensores pollicis* of the left Arm, partly in sight.

41, Parts of the *Radialis Extensor* of the same Arm.

42, Part of the *Latissimus Dorsi*.

43, The *Serratus major Anticus*.

44, The *Rectus Abdominis*, under the two Tendons of the oblique Muscles.

45, 45, The *Obliquus descendens*.

46, Part of the *Glutæus medius*, cover'd with the Tendon of *Glutæus magnus*.

47, The *Pyramidales*.

48, The *Membranosus*.

49, The *Rectus Femoris*.

50, The *Sartorius*.

51, Part of the *Gracilis* in each Thigh.

52, The *Vastus externus*.

53, The *Vastus internus*.

54, The

- | | |
|--|---|
| 54, The first describ'd head of the <i>Triceps</i> . | <i>Digitorum perforantes</i> . |
| 55, The second. | 62, Part of the <i>Tibialis posticus</i> appears near the <i>Malleolus internus</i> . |
| 56, The <i>Tibialis Anticus</i> . | 63, The <i>Extensor pollicis pedis longus</i> . |
| 57, The <i>Peroneus primus</i> . | 64, <i>Extensor Digitorum longus</i> . |
| 58, Part of the <i>Gastrocnemius internus</i> , or <i>Soleus</i> . | 65, The <i>Extensor pollicis brevis</i> . |
| 59, Parts of the <i>Gastrocnemii externi</i> . | 66, The <i>Extensor Digitorum brevis</i> . |
| 60, Parts of the <i>Solei</i> on the inside of the Legs. | |
| 61, Parts of the <i>Flexores</i> | |

C H A P. IV.

Of the BONES and MUSCLES of the NECK.

THE Bones of the Neck are call'd *Vertebræ*, *Vertebræ*. and are in that part ordinarily seven only in Number; tho' Authors say, that some long-neck'd Persons have had eight.

Each *Vertebra* consists of a Body, the Substance of which is spongy or cavernous, having in the middle a large Perforation, thro' which the *Medulla Spinalis* passes, and seven *Apophyses*, or Processes. The fore part of the Body is round, or convex; the hinder, from which spring the Processes, somewhat depress'd or flattish. Their upper and lower sides, by which they are connected to one another, are plain, and cover'd with a *Diarthrosis*. They are join'd to one another by a loose Articulation, with a manifest Motion, with Synchronism an intermediate Cartilage on the Surface of each Bone, and receive one another; the Head of the lower entering a small Concavity in the lower part of the upper; except the first and second of them.

They have all eight Processes, except the first, which have but six, two superior, two inferior, two transverse, and two posterior, which are peculiarly

Spine.

cularly nam'd the Spines ; from which the whole Series of Bones, from the Head to the end of the *Os Sacrum*, consisting in all of thirty Bones, (whereof twenty-four only belonging to the Neck, Back, and Loins, are strictly to be called *Vertebræ*) is named the Spine. The posterior Process is wanting in the first *Vertebra* of the Neck.

Atlas.

App.

Tab. xlix.

Fig. vi.

The first *Vertebra* is called *Atlas* ; because it sustains and supports the Head, to which it is join'd by its ascending oblique Processes, which receive the Tubercle of the *Occiput*.

Epistro-

phus.

Ib. Fig. vii.

The second is call'd *Epistrophus* ; from the middle of which arises a Process resembling a Tooth, and therefore call'd *Dens* ; which is inserted into a *Sinus*, fenced with a Ligament within the great Perforation of the first *Vertebra* : Upon this the Head turns, as upon an *Axis*. The Superfice of this Process is a little rough, upon the account of a Ligament which rises from thence, and ties it to the *Occiput*. It is likewise surrounded by another Ligament, which keeps it from slipping out of its *Sinus*, or Socket, and compressing the Spinal Marrow, which would be a fatal Accident.

Axis.

The third *Vertebra* of the Neck is call'd the *Axis* ; a name better suiting the Office of the former. The rest of the *Vertebræ* have no peculiar Names.

Foramina.

All the transverse Processes are perforated (which is peculiar to those of the Neck) for the Passages of the Cervical Arteries and Veins, which pass to and from the Brain. The Spines of the six lower are forked, and have small Muscles between them, call'd *Interspinales Colli*.

Longus

Colli.

App.

Tab. xl.

Fig. iii.

The first of the Muscles of the Neck is the *Longus Colli*, which arises mainly fleshly, though tendinous in a small part of its Origin, from the fore-part of the five upper *Vertebræ* of the *Thorax*, and

and is inserted into the fore-part of every *Vertebra* of the Neck.

It shews plainly its *Action* to be to bend it forward. This, as most other Muscles of the Neck, secondarily affect the Head in its Motion, as it stands and turns upon the Neck, and so is with them sometimes reckon'd amongst the Muscles common to the Head.

The *Scaleni* are likewise by some accounted Muscles of the Neck ; but serving rather for the Motion of the Ribs, they shall have a place amongst those Muscles, as *Fallopious* has put them. *Scaleni. Ibid.*

The *Spinalis Colli* springs from the five superior transverse Processes of the *Thorax*, and inferior of the Neck. It creeps along the Spine, from which course it is called *Spinalis*, and becomes at last pretty full and fleshy, at its Insertion on the inferior Part of the second *Vertebra* of the Neck laterally. This draws the Neck backwards. *Musculus Spinalis Colli. Tab. ib. Fig. ii. Action.*

Under this lies the *Transversalis Colli* ; which arises fleshy from the transverse Processes of the upper *Vertebra* of the *Thorax*, and is inserted by a several Tendon, into every transverse Process of the Neck, which it turns laterally backwards, serving to look over the Shoulder. *Transversalis Colli. Ibid. Action.*

Besides these, proper to the Neck are five Pair of small Muscles ; discover'd by Mr. *Cowper*, and by him, from their Position, call'd *Musculi Interspinales*. They arise from each double Process of the Spine of the Neck, and run from the upper, to the next below ; into which they are inserted. They serve to approximate and draw together the *Vertebrae* of the Neck, and are more especially proper to this Part, as having both Origin and Insertion in it. *Interspinales Colli. Action.*

Besides these, he has since observ'd others of the same Size and Figure, between the Transverse Processes of the *Vertebrae* of the Neck ; which

which he calls *Intertransversales Colli*. Vid. *Phil. Transact.* Vol. 21. p. 132.

C H A P. V.

Of the BONES of the BACK, and other parts of the
THORAX, and their MUSCLES.

Verte-
bræ.

THE *Vertebræ* of the Back are in Number twelve, and have the same Figure, Processes, Articulations, Cartilages, Perforations, for the *Medulla Spinalis*, with the five lower of the Neck; except that the Body of the *Vertebra* is here somewhat larger, and the Transverse Processes not perforated, as they are in the Neck, for the Passage of the Cervical Arteries; and have on each side of the Body of the *Vertebra*, a small Impression or *Sinus*, for the Reception of the round Head of each Rib: And in the transverse Process another very small one, which receives the Prominence of the Rib near that Extremity.

Sinus.

Sternum.

The fore part of the *Thorax*, call'd the *Sternum*, is covered with a broad spongy Bone, partly Cartilaginous; which for the first seven or eight years of our Lives, do remain such, and consists of eight several Bones, or rather Cartilages, which slowly and in length of time become Osseous, and unite, and seldom have, in Adults, above three distinguishable Bones.

Sinus.

The uppermost of these is the largest and thickest, especially in its upper Part; and has on each side two *Sinus*, one for the Head of the Clavicle (of which more afterwards in its proper place) and another somewhat lower, for the Cartilaginous end of the first Rib.

Sinus.

The second, which is longer than the former, is likewise thinner, and has on each side four or five

five *Sinus*, for the Reception of so many of the Ribs.

The third and last is the least of them, and receiving into its *Sinus*, on each side one or two of the true Ribs, grows narrow afterwards, and ends in a Cartilaginous point, which is call'd the *Cartilago Zyphoides*, or *Ensiformis*, from its Figure, Zyphoides. which is imagin'd to resemble the Point of a Sword. This point is sometimes forked, and then it is call'd *Furcilla*. Furcilla.

On the outside of the *Sternum* is a pretty large Depression, or sinking in about the middle, which is call'd *Scrobiculus cordis*. Scrobiculus cordis.

Its outside is generally rough, for the better hold of the Muscles, which either spring from, or are inserted into it: The inside is smooth.

The Ribs are in Number twelve on each side, Ribs. seven genuine, and five spurious. They are of an arched Figure, making an imperfect Segment Figure. of a Circle, more incurvated towards their Articulation with the *Vertebræ* (which in *per Ginglymum Arthro dialem*) where they are rounder and harder than at the other Extremity towards the *Sternum*, which is less incurvated, much thinner, broader, more spongy, and joyn'd *per Harmoniam* with a Cartilage intermediate, which in Age often becomes Osseous.

They are fastned likewise to the *Vertebræ*, *per* Connexion. *Syneurosin*, by means of their Ligaments.

On the inside of the true Ribs, except the Inferior, and sometimes the next to it, runs a pretty deep *Sinus*, reaching from the end towards the Spine (where it is deepest) almost to its juncture with the Cartilage; which receives the Inter-costal Arteries, Veins and Nerves, and lies just under the upper edge of each Rib. Sinus.

The five lower Pair of Ribs are called Spurious, Nothæ. and are shorter and more cartilaginous than the rest; of which only the first has any Conne-
xion

Connexion. xion with the *Sternum*: The rest growing still shorter every Pair than the other, are joyn'd by their Cartilages to the lower side of that next above them: To the *Vertebræ* of the Back, they are connected only by a simple Process.

Motion. All these Ribs, together with the *Sternum*, are rais'd by means of the Respiratory Muscles, in the Action of Inspiration; by which means, and the Descent of the Diaphragm in that Action, the Cavity or the *Thorax* is enlarg'd, for the more commodious Expansion of the Lungs.

Muscles of the Thorax. The Muscles of the *Thorax* serve for two several Motions; either to move the whole Cavity together upon the *Vertebræ*, as in bending and turning the Body; or the *Sternum* and Ribs only, as in Respiration; by which means its Cavity is alternately dilated and compressed, which occasion Inspiration and Expiration.

Division. The Muscles, which perform these Actions, are divided into Common and Proper.

Common. The Common are those, which though serving for the Motion of these Parts, have their Originations out of the Limits of the *Thorax*.

Proper. The proper are such as both arise and terminate within the Bounds of the *Thorax*.

Subclavius. Among the Common may be reckon'd, first, the *Subclavius*; which arises fleshy from the inferior part of one half of the *Clavicula*, and is inserted into the upper part of the first Rib, which it helps to elevate.

Serratus Major Anticus. Next, the *Serratus Major Anticus*; which arises from the whole *Basis* of the *Scapula*, and has a several Insertion into every one of the true Ribs, and the first of the Spurious: Upon the three lowest of which, it is indented with the Teeth of the *Obliquus Descendens* of the *Abdomen*, from whence it is call'd *Serratus*.

Serratus Minor Anticus. The *Serratus Minor Anticus*, springs from the *Processus Coracoides* of the *Scapula*, and descend-
ing

ing obliquely, spreads it self upon the second, third, fourth and fifth Ribs, into each of which it is inserted. This Muscle has been generally reckoned by Anatomists amongst those of the *Scapula*: But its Insertions into these Ribs plainly justify Mr. Cowper's Conclusion, that it serves *Action.* to draw these Ribs upwards; which use gives it a place here.

Of the *Scaleni* there are three Pair; the first *Scaleni.* of which springs fleshy from the transverse Processes of the second, third and fourth *Vertebræ* of the Neck; where descending laterally, it is inserted into the first Rib, which it helps to draw *Action.* upwards. 1.
Tab. xxv.
5.

The second *Scalenus* arises from the same Processes, as likewise from those of the fifth *Vertebra* of the Neck, and is inserted into the second Rib, and sometimes into the third. Between this Muscle and the former, run the Axillary Nerves. 2.

The third arises from the same Processes with the former, and from those of the sixth *Vertebra* of the Neck, and is inserted into the first Rib. All these draw the Ribs upwards; and are assisted by the *Serrati superiores postici*, and Intercostals of both kinds, which are esteem'd proper Muscles of the *Thorax*. 3.

The *Serratus superior posticus*, lies immediately under the *Rhomboides*. It arises with a thin Tendon, from the lower Spine of the two last *Vertebræ* of the Neck, and from those of the three upper of the *Thorax*, and running obliquely over the *Splenius* and *Dorsi Longissimus*, is inserted into the second, third and fourth Ribs, at their Curvature, by so many several indented Insertions. These help to draw the Ribs upwards. Serratus superior posticus.
Tab. xxvii.
Action.

The Intercostals, of both kinds, are in number Forty four, and are plac'd in the Intervals of *Intercostals.* the *Tab. xxiv.*

the Ribs, on each side eleven external, and eleven internal, which connect and draw together the Ribs. The Fibres of these Muscles run in an Order contrary to each other; which has made most Anatomists imagine, that they antagoniz'd one another, fancying that the external drew upwards, and the internal downwards.

Action.

This erroneous Opinion was first refuted severally by the Learned *Steno*, and our ingenious Dr. *Mayow*: Whose Arguments, however convincing, have, nevertheless, fail'd of Success, over the Prejudices of many later Writers; who calling the upper part of the internal Intercostals, their Origin, and the lower their Insertion, will rightly enough have them to draw upwards; but believing that the internal, upon the score of the contrary course of their Fibres, had their Origination and Insertion just the Reverse to the former, think they must needs act contrary; not considering, that which soever part of these short Muscles, they make the Head or Tail of them, the more moveable Point must necessarily be drawn towards the less moveable (which is the upper) without any regard to their Denominations: And that if these Muscles had opposite Motions, when the external were contracted, the internal must be flaccid and corrugated, contrary to the condition of all other Muscles, which are most extended in length, when over-power'd by their Antagonists. However, *Diemerbroeck* is so confident of having demonstrated the Absurdity of Dr. *Mayow*'s Opinion, that divers Anatomists still retain the old Division, and number the Internal among the Depressors of the Ribs.

Fibres external.

The Fibres of the external, spring from the lower edge of the upper Rib, and running obliquely towards the *Sternum*, end in the outside
of

of the upper edge of the Rib next below. Those of the internal, rise from the inside of the lower *Internal.* edge of the upper Rib, and running obliquely towards the *Vertebræ*, are inserted into the inside of the upper edge of the next Rib, decussating each other in right Angles, without any necessity of a contrary Action.

All these common Muscles co operate with the proper ones of the Ribs, in drawing them upwards, and though their united Force may seem to be infinitely greater than the proper weight of the Ribs would require, yet when we consider the weight of the Atmosphere, which antagonizes, we shall find nothing superfluous in this ample Provision; even though the Muscles which draw the contrary way are inconsiderable, compar'd with them: For though the several Insertions of these Muscles, may make them look as if they were destin'd to move different Parts and Ribs distinctly; yet the continuity of all the Ribs with the *Sternum*, obliges all these Muscles to act together, and to lift up the whole *Compages* of the *Sternum* and Ribs at once.

The common Muscles, which serve for contracting the Cavity of the *Thorax*, by pulling down the Ribs, are the *Sacro-lumbares*, and the *Diaphragma*; to which may be added the Abdominal Muscles; which being fix'd partly to the lower Ribs and *Sternum*, must necessarily in their Action, draw downwards. But of these last we have already given the Descriptions elsewhere.

The *Sacro-lumbaris* hath its Origination in common with the *Dorsi Longissimus*; and externally arises tendinous, from the Posterior part of the Spine of the *Os Ilium*, the superior Spine of the *Sacrum*, and from all the Spines of the *Vertebræ* of the Loins. Internally it arises fleshy; not only from those Parts, but from the transverse Processes

Contractores.

Sacro-lumbaris.
Tab.
xxvii.

cesses of the Lumbal *Vertebræ* ; from whence to the lowest Rib, it seems to be form'd of two *Venters* : Where again, and upon the rest of the Ribs, it is distributed into a great number of Tendons (and, as *Steno* will have it, *Venters* too) variously and irregularly distributed to every Rib ; where, at their Insertions, they are met by other fleshy Fibres, coming from the third, fourth, fifth and sixth *Vertebra* of the Neck, which are justly enough, by *Diemerbroek*, esteemed another pair of Muscles, Antagonists to these, and call'd by him, *Cervicales descendentes*. These should have been numbred amongst the Muscles that elevate the Ribs, but that they are generally by Authors reckon'd (though improperly) as a production and part of the *Sacro-lumbus*.

Cervicales descendentes.

Diaphragm.

The Diaphragm is a common Muscle, belonging in part to this Region of the Body. Both its Structure and Use hath been already spoken of, therefore we shall take no farther notice of it here.

Proper.

The proper Muscles employ'd in contracting the Cavity of the *Thorax*, are first,

Serratus posticus inferior.
Tab.
xxvii.

The *Serratus posticus inferior*, arises from the Spines of three of the lower *Vertebræ* of the *Thorax*, and two upper of the Loins. Both its Extremities are tendinous, and its Belly fleshy, and ends with an indented Termination in the four lower spurious Ribs.

Triangularis.

The *Triangularis*, which has sometimes the appearance of three or four distinct Muscles on each side, arises from the inside of the *Sternum*, and is implanted into the Cartilages, which joyn the four lowest true Ribs, to the *Sternum*. The

Action.

Action of this Muscle is very obscure, since they have both their Origination and Insertion at a part not moveable, but together ; towards which it is not easily conceivable, how they should contribute.

Perhaps

Perhaps their use is not really for Motion; *A Con-* which I am the rather apt to suspect, because *jecture a-* they seem not to be affected by any Antagonists, *bout their* but to be in a perpetual State of Tension, by *use.* which they may possibly conduce towards the forming of the necessary Incurvation of the *Sternum*; and by their over-tension in young Children, whilst the Cartilages are soft, may occasion that Morbid Acumination of the *Sternum*, which is observ'd in Rickety Children. The strength of this Conjecture might be much confirmed or abated, if it were found, that in young Children these Muscles were proportionably larger than in Adults. But of this I have made no Observation, nor do I find any Authors that have, and therefore leave it to farther Enquiry.

T A B. XXIV.

A Side-View of the External Muscles, after the *Obliquus Descendens* is remov'd.

1, The *Musculus Frontalis*.

2, The *Orbicularis Palpebrarum*.

o, *Elevator Alæ Nasi*.

3, The *Elevator Labii superioris*, & *Dilatator Alæ Nasi*.

4, *Elevator Labiorum communis*.

5, *Elevator Labii superioris proprius*.

6, *Depressor Labii inferioris proprius*.

7, *Depressor Labiorum communis*.

8, *Spincter Labiorum*.

9, *Zygomaticus*.

10, The *Buccinator*.

11, The *Masseter*.

12, *Temporalis*.

13, *Elevator Auriculæ*.

14, *Mastoideus*.

15, *Elevator Scapulæ*.

16, Part of the *Scalenus* and *Subscapularis*. Vid. Tab. 25. N. 5.

17, Part of the *Coracobrachialis*.

18, Part of the *Cucullaris*.

19, Part of the *Digastricus* of the right Side, near its Temination.

20, The *Sternohyoides*.

21, The *Deltoides*.

22, The *Pectoralis*.

23, The *Coracobrachialis* partly seen.

24, The *Biceps Cubiti*.

25, The *Brachæus internus*.

26, Parts of the *Gemellus* in both the Arms.

27, The *Pronator Radii teres*, in the left Arm, running

ning under the Tendinous Expansion of the *Biceps*.

28, The *Supinator Radii longus*.

29, The *Extensor Carpi radialis*.

30, The Extenders of the Thumb.

31, The *Abductor pollicis*.

32, The *Abductor indicis*.

33, Part of the *Flexor secundi Ossis pollicis*.

34, The *Radialis Flexor*.

35, Part of the *Flexor Digitorum Perforatus*.

36, The *Abductor pollicis* in the left Hand.

36, In the right Hand the *Extensor Digitorum communis*.

37, *Minimi Digiti extensor*.

38, The *Ulnaris extensor Carpi*.

39, The *Ulnaris flexor Carpi*.

40, Part of the *Teres major*.

41, Part of the *Latissimus Dorsi*.

42, Part of the *Serratus major Anticus*.

43, The *Intercostales externi*.

44, The *Obliquus Ascendens in situ*, with its Tendon running over the *Rectus* 47, to the *Linea Alba h*.

45, Part of the *Obliquus Descendens*.

46, The *Pyramidalis*.

47, The *Rectus Abdominis*.

48, The *Musculus Membranosus*.

** Part of its Membranous Expansion, which is implanted on the upper *Appendix* of the *Fibula* †.

49, Parts of the *Sartorius* on both Thighs.

50, Part of the *Glutæus Medius*, under the Tendinous Production of the *Glutæus magnus*.

51, Part of the *Glutæus magnus*.

52, The *Rectus Femoris* in both Thighs.

53, Part of the *Triceps*.

54, Part of the *Gracilis*.

55, The *Vastus internus*, part of which is seen in the left Thigh.

60, The *Vastus externus*.

61, Part of the *Biceps Femoris*, near its Termination.

62, The *Tibialis Anticus*, in the left Leg, *in situ*; in the right Leg its Tendon only is express near its Termination.

63, The *Gastrocnemius internus* in both Legs.

64, The *Extensor Digitorum pedis longus*.

65, The *Peronæus longus*.

66, Part of the *Gastrocnemius externus* of the right Leg.

67, Parts of the *Soleus* in both Legs.

68, The long Tendon of the *Musculus Plantaris*.

69, Part of the *Tibialis posticus*, as it passes behind the *Malleolus internus*.

70, Part of the *Flexor Digitorum pedis perforans*.

71, *Extensor pollicis pedis longus*, to be seen near its Termination only in the left Foot.

72, The *Abductor pollicis pedis*.

73, *Extensor Digitorum pedis brevis*.

74, *Abductor minimi digiti pedis*.

75, *Ex-*





M. L. de G. Sculp.

75, *Extensor Pollicis brevis*.

76, Part of the *Peronæus brevis*; the rest of it lying under the *Longus*, 65.

a, The *Os Jugale*.

b, The *Parotid Gland*.

c, Its *Ductus salivalis*.

d, The lower Jaw-bone bared.

✠ Part of the Inferior Maxillary Gland seen.

e e, The *Claviculæ*.

f, The *Sternum*.

GG, The Cartilaginous endings of the Ribs, below the *Sternum*.

g, The *Cartilago Ensiformis*.

h, The *Linea Alba*.

i, The Navel.

k, The Spine of the *Os Ilium* bared, by removing the

Musculus Obliquus Descendens.

l, The Process of the *Peritonæum*, inclosing the Spermatick Vessels, as it passes thro' the *Musculus Obliquus Ascendens*, to the *Testes*.

m, The *Os Pubis*.

n, The *Glandula Inguinalis*.

o, The great *Trochanter*, under the Tendinous Expansion of the *Glutæus magnus & membranofus*.

p, The *Patella*.

q, The lower *Appendix* of the *Os Femoris*.

r, The *Tibia*.

s, The *Malleolus internus*.

t, The *Malleolus externus*.

u, The *Ligamentum transversale Pedis*.

CHAP. VI.

Of the CLAVICLES, SHOULDER-BLADE, BONES of the SHOULDERS, ARMS, HANDS and FINGERS, with their MUSCLES.

ON the outside of the *Thorax*, besides those which constitute the Cavity of it, appear four Bones; two before and two behind.

Those before are two small Bones, situated at the bottom of the Neck, on each side; in length about half a Foot, and about the thickness of the lower part of a Man's Finger; a little bent towards each end different ways, somewhat like the Letter S. Their inner Substance is spongy, which renders them very brittle, and easy to be broken, and again disposes them as easily to coalesce upon setting, and without any manual Operation, they will frequently do so in Children.

Claviculæ.
Tab. xxi,
& xxii.

Substance.

Connexion.

They are joyn'd to the *Acromium* of the *Scapula*, by a flat thick Head, *per Synchondrosin*; and on the fore-part by a round Head, *per Arthrodiem*, to a *Sinus* on each side of the upper part of the *Sternum*.

Use.

It serves to fix the Shoulder-Blade, so as to keep it from slipping too forwards upon the *Thorax* in Men, and those Animals which use their Fore-Legs or Hands, as Monkies, Squirrels, &c. In hoofed Animals, who use their Fore-Legs for nothing but to tread upon, the Clavicles are very small; being under a Necessity of bringing their Fore-Legs very near each other in walking, &c.

Scapu'æ.

Tab. xxii.

The *Scapulæ*, or *Omoplatæ*, in *English* the Shoulder-blades, are two large broad Bones, of the Figure of an irregular Triangle of unequal sides, situated on each side of the upper and back part of the *Thorax*; of a pretty solid firm Con-

Substance.

texture, tho' very thin in some Places. The upper, or outside of it is somewhat Convex; the inner, a little concave: The Edges, which are pretty thick, are call'd the *Costæ*; and along the middle of the outside, lengthways, runs a large long Process, which is call'd the Spine; betwixt the bottom of which, and the *Costæ*, lies the thin part of the Bone. The end of the Spine, which receives the Extremity of the *Clavicula*, is called

Spine.

Acromium.

Acromium. The second, which is somewhat lower, is short and sharp, and, from a fancy'd similitude to a Crow's Bill, is called *Coracoides*.

Coracoides.

The third, which makes the Head of this Bone, has in it a pretty large, but shallow round *Sinus*, lin'd with a Cartilage, which receives the Head of the *Os Humeri*.

Cervix.

Use.

It serves to receive the Heads of the *Claviculæ* and *Humerus*, and to give rise to the Muscles which move the Shoulder.

Muscles.

There are four Pair of Muscles ordinarily assign'd to the *Scapula*; of which the first is the

Serratus

Serratus minor Anticus : Which having its other Extremities upon the Ribs, which are more easily moveable than the *Scapula*, has been describ'd amongst the Elevators of the *Thorax*. Serratus minor Anticus. Tab. xxv.

The next is the *Cucullaris* ; so call'd from the resemblance of a Monk's Cowl ; or *Trapezius*, from the geometrical Figure call'd *Trapezium*, to which, another way consider'd, it bears a Similitude. This Muscle might more justly be reckon'd three, as well upon the score of the various Origination of its Fibres, as from these different Actions. The upper Order of Fibres (or Muscle) springs from the *Os Occipitis* ; the second from the Spine of all the *Vertebræ* of the Neck ; and the third from the Spines of the eight upper *Vertebræ* of the *Thorax*, or Back, and are inserted into the Spine *Acromium*, and *Basis* of the *Scapula*, and to part of the *Claviculæ*. From the different Dispositions of these Fibres, the *Scapula* is drawn different ways ; the first pulling obliquely upwards ; the last, according to their situation, obliquely downwards ; and the middle, backwards. When they act all three together, they are said to draw backwards only ; that is, in truth, the two Extremes antagonizing ; the middle is only at liberty, and does really act. Cucullaris. Tab. xxvi. More properly to be reckoned three. Action.

Under this lies the *Rhomboides* ; so call'd from its Figure, which arises from the two inferior Spines of the *Vertebræ* of the Neck, and the four first of the *Thorax* ; whence descending obliquely, it is inserted into the whole length of the *Basis*, or lower edge of the *Scapula*, which it draws backwards, and a little upwards. Rhomboides. App. Tab. xlvi. & xli. Action.

The third, (or, according to the reckoning of some, the fourth) is the *Levator Scapulæ* ; call'd also *Musculus Patientiæ*, from the Action of shrugging up the Shoulders in forc'd Submissions. This arises, by separate Originations, from the Levator Scapulæ. Tab. xxvii.

transverse Processes of the second, third, fourth, and fifth *Vertebra* of the Neck, and is inserted into the upper Angle of the *Scapula*, which it pulls backwards.

Action.

Os Hu-
meri.

Tab. xxi.
& xxii.

Head.

The upper Bone of the Arm, which is by some call'd *Humerus*, and *Os Humeri*, reaches from the Shoulder, or shallow Socket in the Neck of the *Scapula*, to the upper end of the *Cubitus* at the Elbow. It is a large, long, round, fistulated Bone, of a pretty hard compact Substance; and its inward Cavity, which contains the Marrow, is pretty long and large. At the upper end it has a large round Head, which is cover'd with a very smooth Cartilage, which is receiv'd into the Cavity of the *Scapula*, and makes a *Juncture per Arthrodiem*. This Head of the Bone being much larger than the Socket into which it is receiv'd, the Part extant is strictly embrac'd by a Ligament, the edge of which is fastned to the Margin of the Cartilaginous Socket of the *Scapula*, the other to the lower part of the Head of this Bone; thereby uniting them firmly together, yet so as to leave the Motion the freest of all the Articulations of the Body, and therefore liable to Dislocations.

*Lower
end.*

At the lower end it has two Processes, cover'd each with a Cartilage: One external, which receives the Extremity of the *Radius*, which is the lesser of the two: The other internal, which being larger, receives the Head of the *Cubitus*. On the outside of each of these Processes there is a small Tubercle, or Eminence, (as it were a little Process budding out of a greater) to which are connected the Ligaments and Heads of the Muscles, which move the *Carpus* and Fingers; of which anon. In this Bone are three *Sinus*: One on the fore-side of the larger Process, which receives the Fore-Process of the *Cubitus*: Another on the back-part, which receives the Hinder-
Process

Sinus.

Process of the *Cubitus*, called *Olecranon*: And a third a small semilunar one, between the two Processes, answering to the Eminence of the *Sinus* of the *Cubitus*.

The later Anatomists are generally agreed in allowing to the Motion of this Bone five Pair of Muscles, and five different sorts of Motion; upwards, downwards, forwards, backwards, and rotatory.

The Arm is moved upwards by the *Deltoides*, *Supraspinatus*, and *Coracobrachialis*.

The *Deltoides*; so call'd from the Greek Δ , which it resembles, is a large strong Muscle, arising from the middle of the Clavicle, the *Acromium*, and the whole length of the Spine of the *Scapula*; and is inserted into the middle of the *Os Humeri*, on the inner side. *Steno* makes twelve distinct Muscles, which, according to the course of their several Fibres, alter and compound the Motion of this Bone.

The *Supraspinatus* has its Name from its fleshy Origination, at the upper end of the *Basis* of the *Scapula* above the Spine, to the upper part of which it is likewise connected, and to the superior Rib of the *Scapula*; whence marching along the upper *Interscapulium* (or thin part of the *Scapula*, between the upper *Costa* and Spine) which it fills, it passes under the *Acromium* and Articulation of the *Humerus*, and embraces with its Tendon the Neck of that Bone.

The *Coracobrachialis* arises partly fleshy, partly tendinous, from the *Processus Coracoides* of the *Scapula*, and passing over the Joint of the *Humerus*, is inserted into the middle of the inner part of the Bone, which therefore it draws somewhat obliquely outwards, as well as upwards.

The Muscles drawing downwards, are *Teres*, or *Rotundus major*, and the *Latissimus Dorsi*.

*Teres or
Rotundus
major.*
Tab. xxvi,
xxvii.

The *Teres major* arises from the lower angle of the *Basis* of the *Scapula*, and ascending obliquely upwards, in a round smooth Body, under the Head of the *Longus*, is inserted with a short flat Tendon into the Neck of the *Os Humeri*, close by the following; which is the

*Latissimus
dorsi.*
Tab. xxvi.

Latissimus Dorsi, and arises thin, broad, and tendinous, from the seven lower *Vertebræ* of the *Thorax*, from all those of the Loins, and the superior of the *Os Sacrum*, and the posterior part of the Spine of the *Os Ilium*. In its Passage over the *Longissimus Dorsi*, *Sacrolumbus*, and the incurvate part of the Ribs, it begins to grow thick and fleshy, by means of several *Fasciculi* of Fibres which it receives from the Ribs: But its Body is again extended in its Passage towards the *Axilla*, over the lower Angle of the *Scapula*, and is at last inserted into the *Os Humeri*, just by the *Teres major*, with a broad, strong Tendon. This Muscle is by some call'd *Aniscalptor*; a Name which sufficiently implies its Action downwards and backwards.

*Aniscal-
ptor.*

*Pectoralis
Forwards.*
Tab. xxiii,
xxiv.

The *Pectoralis*, which is the only Muscle that properly moves the Arm forwards, arises broad and fleshy, with a semicircular Origination, from part of the *Clavicle*, *Sternum*, Cartilages of the six superior Ribs, and bony part of the seventh, and from some of the upper of the spurious Ribs. Those Fibres which spring from these lower Parts, running across, and decussating those which spring from the upper, make together a Body of a Muscle, which covers almost all the fore-parts of the *Thorax*, and is at last inserted by a thick, short, strong Tendon, into the upper and inner part of the *Humerus*, between the *Biceps* and *Deltoïdes*: The lower Fibres making the upper part, and the upper the lower part of the Tendon. This draws the Arm forwards.

The

The *Infraspinatus* arises from the inferior parts of the *Basis*, Spine, and under *Costa* of the *Scapula*, and filling the lower *Interscapulium*, passes on between the Spine and *Teres Minor* in a triangular Form, and growing tendinous at the Cone, is inserted into the Head of the *Humerus*, and draws directly backwards.

Infraspinatus.
Tab. xxvi,
xxvii.

The next is the *Transversalis*; call'd also *Teres*, and *Rotundus minor*, which is sometimes wanting, or so confounded with the former, as to be lost in it. It arises from the inferior Angle of the *Scapula*, and ascending obliquely in a round fleshy Body, and passing over the upper Head of the *Longus*, is inserted by a short flat Tendon, below the Neck of the *Os Humeri*.

Transversalis.
Tab. Ib.

The *Subscapularis* arises from the *Basis* and *Costa* of the *Scapula*, and spreading it self under the whole Convex, or under-side of it, is inserted by a semicircular Tendon into the Neck of the *Os Humeri*, and draws it down to the side of the Trunk.

Subscapularis.
App.
Tab. xlii.
Fig. ii.

The Tendons of these three last Muscles make together a Circle about the Head of the *Humerus*, and, acting successively after each other, give a rotatory Motion to the whole Arm.

Rotatory Motion.

The Bones of the next Joynt, which reaches from the Elbow to the Wrist, are the *Cubitus*, or *Ulna*, and *Radius*, upon which all the rest of the Arm and Hand below the *Humerus* is mov'd together.

Cubitus.

The *Ulna* is a pretty large, long, solid Bone, without any considerable Cavity for Marrow. The outside of it is convex, the inner concave; having a *Fossula*, or indented Chink, running along its middle the whole length of it. It is bigger on the upper, towards which it descends, as it were, tapering. At its Head, or upper end, it is joyn'd to the *Os Humeri per Ginglymum*, by means of its semi-lunar *Sinus*, which receives the

Ulna.
Tab. xxi,
xxii.

Ginglymus.

inner

Olecranon.

Ligaments.

inner Protuberance of the lower end of the *Os Humeri*, and sends off two Processes, both call'd *Rostra*, one on the fore-part, which enters the fore and lesser *Sinus* of the *Os Humeri*; the other larger on the hinder-part, and longer, called (after *Hippocrates*) by a peculiar Name, *Olecranon*; which is receiv'd into the hinder *Sinus* of the aforesaid Bone, forming thereby a perfect *Ginglymus*; whereby it is moved upon this Bone as by a Hinge, which is strengthned and secured by the Ligaments, which from these Processes are sent up to the *Humerus*, as well as by those which descend to it from the lateral Tubercles of the Processes of the *Humerus*, already mention'd.

It has also, at its upper end, another small lateral *Sinus* on the inside, which receives the circumference of the round Head of the *Radius*, which rolls upon it for the Pronation, or turning down of the Palm of the Hand; or Resupination, which is the turning of it up; which Motions are perform'd here by means of the *Radius*.

The lower end of the *Cubitus* is small and round, and is receiv'd into the lower end of the *Radius*, by a *Sinus* in the side of it. Upon this Extremity the *Ulna* has a small Process, call'd *Styloides*, from which rise the Ligaments which fasten it to the Bones of the *Radius*, and tie those Bones likewise to one another.

Radius, or
Focile
minus.
Tab. xxi,
xxiii.
Articulations.

The *Radius* is a long slender Bone, which descends along with the *Ulna*, from the Elbow to the Wrist, touching only at the Extremities; at the upper of which it is received by the *Cubitus*, as the lower receives it, making by both Articulations an imperfect sort of *Ginglymus*. The upper end of this Bone, which rolls upon the *Ulna*, is cover'd with a Cartilage, and has on its top a small round Indentation, or *Sinus*, which receives the outer Process of the *Humerus*. The lower end of this Bone is thicker than the upper; and has

has besides the lateral *Sinus*, which receives the *Sinus*.
Cubitus, two other *Sinus* at its Extremity, which
 receives the Bones of the Wrist. Both these
 Bones are a little incurvated, by which means *Vid. Tab.*
 they are kept from approaching each other, ex- *xxi, xxii.*
 cept at their Extremities, and are ty'd together
 by a strong Membranous Ligament.

The Muscles of the Cubit are in number five; *Muscles of*
 two Flexors, and three Extensors. The Flexors *the Cubit.*
 are first,

The *Biceps*, so call'd from its springing from *Biceps*.
 two Heads; one of which rises round and tendi- *Tab. xxiii.*
 nous, from the upper edge of the Neck of the *xxiv.*
Scapula, and is convey'd along the Channel in the
 Head of the *Humerus*. Mr. *Cowper*, in his Book
 of the Muscles, tells a remarkable Case of a Dis-
 location, or slipping of this Head out of this
 Channel. The other arises from the *Processus Co-*
racoides, broad and tendinous, and both together
 unite on the fore-part of the *Humerus*, about the
 middle, and is by most Authors said to terminate
 in a round strong Tendon into the Tubercle, at
 the upper end of the *Radius*. But Mr. *Cowper*
 has observ'd it to be double, and to expand it self
 in form of a Membrane, over the *Pronator teres*
Radii, and to joyn with the *Membrana commu-*
nis Musculorum of the *Carpus* and *Fingers*. This
 may be accounted common to both *Radius* and
Cubitus.

The next is *Brachiaeus internus*; which lies un- *Brachiaeus*
 der the former, and arises fleshy from the inter- *internus.*
 nal part of the *Humerus*, at the Insertion of the *Tab. xxv.*
Deltoides and *Coracobrachialis*, and running over
 the Juncture of the *Humerus* and *Cubit*, is in-
 serted partly fleshy, partly tendinous, into the
 superior and fore-part of the *Ulna*, and bends
 the Arm.

The next is *Gemellus*, or *Biceps externus*; which *Gemellus.*
 rises with two Heads: One tendinous from the *Tab. xxvi,*
 upper *xxvii.*

upper part of the inferior *Costa* of the *Scapula* ; whence it passes between the two round Muscles to the back-part of the *Humerus*, where it joyns its other Head ; from whence they run both together, to their Insertion at the *Ancon*, or tip of the Elbow, made by the *Olecranium*, or outer Process of the Cubit. This is the first Extender of the Cubit, and is by most Authors reckon'd two distinct Muscles ; the first being call'd *Longus*, and the other *Brevis*.

Longus.

Brevis.

*Brachæus
externus.*

Tab. ib.

The third is the *Brachæus externus* : It arises from about the middle of the back-part of the *Humerus*, a little below the *Brevis*, and goes to one common Insertion with the former at the *Olecranium*. This may also be reckon'd a third Head of the same Muscle ; which may therefore be call'd *Triceps Brachæus*.

Anconæus.

*Tab. xxvi,
xxvii.*

The *Anconæus* arises from the inferior and back-part of the *Humerus*, and is inserted laterally into the *Ulna*, about an Inch, or Inch and half below the *Olecranium*. These are all Extenders.

*Muscles of
the Ra-
dius.*

The *Radius* has besides the *Biceps*, which is common, four proper Muscles ; which serve to make it roll upon the Cubit or *Ulna*.

*Pronator
Radii
teres.*

Tab. xxv.

The first is the *Pronator Radii teres*, by some call'd *superior Rotundus* ; which arises fleshy from the internal Extuberance of the *Humerus*, and is inserted obliquely into the middle of the *Radius* outwards.

*Pronator
Radii qua-
dratus.*

*App. Tab.
xlii. Fig.
v.*

The next is the *Pronator Radii quadratus*, or inferior ; which arises broad and fleshy, from the lower and inner part of the *Ulna*, and passing over the Ligament, that joyns the *Radius* and the Cubit, is inserted broad into the upper and external part of the *Radius*. Both these turn the Palm of the Hand inwards.

*Supina-
tor.*

Longus.

Tab. xxiv.

The other two are the *Supinatores* : The first, which is call'd *Longus*, arises broad and fleshy, from the superior and external part of the *Humerus*,

rus,

rus, two or three Fingers breadth below the Insertion of the *Deltoides*, and descending obliquely, is inserted with a broad flat Tendon, into the external and lower part of the *Radius*, near the *Carpus*.

The second is the *Supinator brevis*; which arises tendinous and fleshy from the upper part of the outside of the *Ulna*, and passing obliquely over the *Radius*, is inserted into its upper and forepart, just below the Tendon of the *Biceps*. These turn the Palm of the Hand upwards.

Supinator
Brevis.
Tab.
xxvii.

Though our Method has oblig'd us to describe the Muscles of the *Radius*, immediately after those of the *Ulna*, that the Action of those two Bones, so extraordinarily united, may be seen together: Yet it is worth the notice of a young Dissector, that these four last Muscles are not fairly to be exhibited by the Knife, till the Muscles of the *Carpus*, *Vola*, or Palm, and even of the Fingers, have been examin'd, and in part at least rais'd.

The Hand, which is by some call'd *extrema Manus* (these reckoning the Arm and Shoulder-bone into the Hand) is divided into three Parts: The *Carpus*, in *English*, the Wrist; the *Metacarpium*, which alone is in *Vulgar English* call'd the Hand; and the Fingers.

The *Carpus*, or Wrist, consists of eight small Bones, of different Figures and Sizes; these lie in Rows or Ranks, four in each. The upper four of which are articulated on their superior Part, with the lower end of the *Radius*; the under four to the Bones of the *Metacarpus*. They are firmly fastned together to one another, by the Ligaments that come from the *Radius* before-mention'd, and by that expansion of the Tendon of the *Biceps*, which in the Description of that Muscle, we have taken notice to have spread it self over all those Parts.

Carpus.
Tab. xxi,
xxii.

Fascia tendinosa.

Metacar-
pium.
Tab. xxi,
xxii.

Dorsum
Manûs.
Vola.

The *Metacarpium* only consists of four Bones, reaching from the four lower Bones of the *Carpus*, to the first of the *Fingers*. These are long, slender and fistulous, having within a Cavity pretty considerable for their Size, fill'd with Marrow. They are a little incurvated, convex on the exterior part, which is called *Dorsum Manûs*, which with us is call'd the Back of the Hand; and concave on their Interior, which is call'd *Vola*, or the Palm of the Hand. These Bones, like those of the *Radius* and *Cubitus*, touch one another only at their Extremities, leaving Interstices in the middle, for the Passage of the *Musculi Interossei*. At the upper end of each is a small *Sinus*, which receives the Bones of the Wrist; and at the lower end a small round Head, which is receiv'd by a small *Sinus* in the Bones of the *Fingers*.

Bones of
the Fin-
gers.
Tab. xxi,
xxii.

The Bones of the *Fingers* are in each Hand fifteen, three to the Thumb, and three to each Finger, dispos'd in three Rows, which are call'd *Phalanges*; the upper of which is the longest and largest, the second less, but longer and larger than the third. They are all a little round, and convex on the back-part, but flat and plain on the inside, with a very small Hollow: Laterally they have a small Convexity between the Extremities of each Bone, of the two first Rows especially, made by the Protuberance of their Extremities, which wearing off gradually, makes the Depression most considerable in the middle. This in the two middle *Fingers* is alike on both sides, but in the fore and little Finger, greater on the inside than the outer. The upper Row has in the Head of each Bone a small *Sinus*, which receives the Protuberances of the Bones of the *Metacarpium*. At the lower end they have a little round Head, which is receiv'd again by the Bones of the second Row; which have like the former, each

each a Cavity at the top, and a Protuberance at the bottom, for the same use. The third and last, receive the second as they did the first.

The Thumb is immediately articulated with *Thumb.* the *Carpus*; and its Bones, with respect to one another, bear the same Number, Order, Proportion and Articulation with the former.

In the Articulations of the Bones of the two lower Joints with each other, and the first, the Eminence of the Bone receiv'd, is as it were parted into two; and accordingly, the *Sinus* in the Bone below, which receive them, must be so.

Besides these, there are fifteen very small Bones, *Offa Sesamoidea.* call'd *Sesamoidea*, from some fancy'd Resemblance in Bulk and Figure to Grains of *Sesamum*; and are placed, one on the inside of each *Internodium*, or Joint of the Fingers, and seem to serve as a sort of *Trochleæ*, or *Pullies* for the Tendons that bend the Fingers, and may be reckon'd as little *Patellæ*.

These Bones are held together by several *Ligaments.* Ligaments, two whereof serve particularly for the Bones of the *Carpus*; one, a long one, rising from the lower part of the *Cubitus* and *Radius*, and spreading over the Bones of the *Carpus*, connects them together: The other is a round one, or as *Annulare.* some will have it, two transverse, that meet together, and enclose the *Carpus* in the manner of a broad Ring. There are several Fibres interspers'd about the Bones of the *Metacarpus* and Fingers, and which serve to connect them together, but have no particular Names or Descriptions. *Tab. xxiii. N.*

The Muscles of the *Carpus*, or Wrist, come next to be describ'd, according to our Method: *Muscles of the Palm of the Hand and Wrist.* But the Muscles of the Palm of the Hand lying immediately over them, and having some Influ-

ence on the Motion of the *Carpus*, we shall begin with them.

Palmaris
Longus
Tab. xxiii.

These are in Number two: The first is called *Palmaris Longus*, and rises from the internal Ex-tubérance of the *Humerus*, with a narrow Origin, which soon increases to a fleshy Belly, and again becoming tendinous, runs in a flat slender Tendon along with the Tendon of the *Flexor Carpi superior*, to which it sometimes firmly adheres; whence running over the *Ligamentum Annulare*, it expands itself, and cleaves fast to the Skin of the Palm, and is inserted laterally, by a several Tendon, into the Root of each Finger. The fleshy beginning of this Muscle, has been observ'd to be sometimes wanting, or perhaps so perplexed with the Fibres of other Muscles, as to be lost to Observation: A thing very common amongst the Muscles, and which probably has occasioned those great Differences among Anatomists, in their Accounts, as to the Number and Structure in almost all Parts of the Body.

Palmaris
Brevis.
Ibid.

The second is the *Palmaris Brevis*, or *Quadratus*: A Muscle by many Anatomists not taken notice of, though describ'd by *Fallopins*, *Spigelius* (who calls it *Caro quadrata*, and makes it serve to extend the Hand) and some other Anatomists, but very imperfectly. It arises from the outside of the Bone of the *Metacarpus*, which is articulated with the little Finger, and from one of the *Carpus*, with a broad membranous Tendon, and running transverse, is inserted into the eighth Bone of the *Carpus*.

Action.

The first of these serves to contract the Palm in grasping: The second to draw it into a hollow Figure.

Division
of the
Bones of
the Wrist.

The Muscles properly of the Wrist are four: Two *Flexors*, which are internal; and two *Extensors*, which are external.

The first *Flexor* is the *Cubitæus internus*, call'd also *Flexor Carpi Ulnaris*; which arises tendinous from the inner Extuberance of the *Humerus*, and upper part of the *Ulna*, upon which it runs along, till passing under the *Ligamentum Annulare*, it is inserted by a strong short Tendon, into the fourth Bone of the first Row of the *Carpus*. Flexor Carpi Ulnaris. Tab.xxiii. xxv.

The next is *Radixæus internus*; which rises from the same Part with the former, and running along the *Radius*, is inserted into the upper part of that Bone of the *Metacarpus* which is joyn'd with the fore-finger. Both these Muscles bend the Wrist. Flexor Carpi Radialis. Ibid. Action.

The first Extensor, is the *Cubitæus internus*, or *Extensor Carpi Ulnaris*; which coming from the internal Protuberance of the *Humerus*, and passing tendinous under the *Ligamentum Annulare*, is inserted into the upper part of the Bone *Metacarpium*, that answers the little Finger. If this and the *Ulnaris Flexor* move together, they draw the Hands sideways towards the *Ulna*. Extensor Carpi Ulnaris. Tab.xxvi. Action.

The next is the *Radixæus externus*, call'd also *Bicornis*, and *Extensor Radialis*; which is rather two distinct Muscles: The outermost arising fleshy, above the external Protuberance of the *Os Humeri*; the inner below that Protuberance. Both run along the exterior part of the *Radius*, and passing under the Tendons of the *Extensores Pollicis* and *Ligamentum Annulare*, are inserted into the upper parts of the Bones *Metacarpium*, that articulate with the fore and second Finger. These, with the *Radixæus internus* together, draw the Hand sideways towards the *Radius*: With the Muscle foregoing they conspire to extend it. Extensor Carpi Radialis. Tab.xxvi. Action.

The Muscles of the Fingers are some common to all the Fingers, and some proper. The common ones are those which have their Origins from the Bones of the Arm, as the *Sublimis*, *Profundus*, *Lumbricales*, and the *Extensor communis Digitorum*. Muscles of the Fingers.

gitorum. The proper are such as have their distinct Originations and Terminations without intermixture, in each respective Finger. These are the *Interossei*, the Extensor and *Abductor Indicis*, the Extensor and Abductor of the little Finger.

Perforatus.

Tab. xxv.

The first of the common is the *Sublimis*, or *Perforatus*; so call'd from the Perforations of its Tendons by those of the *Perforatus* next to be describ'd, and *Flexor secundi Internodii*, from its Action. It arises tendinous, from the internal Protuberance of the *Humerus*, between the *Flexores Radii*, and from the upper part of the *Radius* before; and being parted into four, passes under the Annular Ligament, whence it sends a several Tendon into the upper part of the second *Phalanx* of each Finger; every Tendon having at the first Internode, a Slit or Perforation for the Admission of the Tendons of the *Profundus*.

Perforans.

Tab. xxv.

App.

Tab. xlii.

Fig. iv.

Or *Perforans*, or *Flexor tertii Internodii*; which arises fleshy from the fore and upper part of the *Ulna*, and from the Ligament which joyns that and the *Radius*, and after having form'd a pretty thick fleshy Body is split into four round Tendons, which passing under the Annular Ligament, and through the Slits in the Tendons of the former, are inserted into the third Bone of each Finger.

This Perforation through the Tendons of the former Muscle, and the membranous Cases which the Tendons of both these Muscles receive from the *Aponeurosis Palmaris*, is singular in these Muscles, and those of the Feet.

Lumbricales.

Ibid.

The *Lumbricales* are commonly suppos'd to be nothing but Branches of the Tendons of the *Perforans*, which go to the inside of the first Bone on each Finger, and are thought to contribute to the variety of Motions which the Fingers have, by giving a diversion to the direct Actions of

Action.

of

of the other Muscles ; but simply, they only serve to draw the Fingers towards the Thumb. But Mr. *Cowper* has observ'd some of them to have distinct Originals, and suspects that the rest may have so, and therefore makes them distinct Muscles.

The *Extensor communis Digitorum* arises sharp and tendinous, from the outward Extuberance of the *Humerus*, and becoming fleshy about the middle of its Progress, divides, and passes with three Tendons under the annular Ligament, and is inserted into all the Bones of the three first Fingers, near the first *Internodii*. These Tendons send some Fibres to each other, as likewise do the *Interossei* to them before they terminate.

Extensor
commu-
nis Digi-
torum.
Tab.xxvi.

The *Interossei* are in number eight, as some will have it, reckoning the *Abductores* of the *Index*, and *Articularis* amongst them. They are divided into Internal and External : The Internal arise from the Bone of the *Metacarpus*, and lie in the Spaces that these Bones make towards the Palm of the Hand, from whence they send small Tendons to the insides of the lower *Phalanx* of the Fingers, and joyn with the Tendons of the *Extensor communis*. The External arise likewise from the upper parts of the *Metacarpus*, towards the *Carpus*, and lie in the Interstices form'd by those Bones and send their short Tendons to the outsides of the first Bones of the Fingers ; but their longer Tendons joyn with those of the *Lumbricales*, and pass to their Insertions in common with the *Extensores Digitorum*. These not only draw the Fingers from each other, but serve to extend them.

Interos-
sei.

Action.

The *Abductor Indicis* arises from the inside of the Bone of the Thumb, and is inserted into the first Bone of the Fore-finger, which it draws towards the Thumb.

Abductor
Indicis.
Tab.
xxvi.
Action.

Abductor
Auricularis.

The *Abductor* of the *Auricularis*, or little Finger (by some call'd *Hypothenar*) springs from the *Ligamentum Annulare*, and from the third and fourth Bone of the *Carpus*, in the second Rank, and is inserted externally into the first Bone of the little Finger, which it draws from the rest.

Action.

Neither of these two can therefore be reckon'd among the *Interossei*; which strictly, are those only which arise from among the Bones of the *Metacarpus*: However, they serve, when they act all together, to expand the Fingers; and these do the same particular Office which some of the *Interossei* do for the other Fingers.

Extensor
Indicis.
Tab.
xxvii.

Besides these Muscles proper to the Fore-finger, is the *Extensor Indicis*, which rising from the middle of the *Ulna* outwards, passes under the Annular Ligament, and at the third Bone of the Fore-finger joyns the *Extensor communis*.

Auricularis.

The little Finger has likewise its proper *Extensor*, which arises from the external Protuberance of the *Humerus*, and partly from the *Ulna*, and passing under the Annular Ligament, is inserted into the outside of the third Bone of the Finger.

Muscles
of the
Thumb.
Flexores
Pollicis.

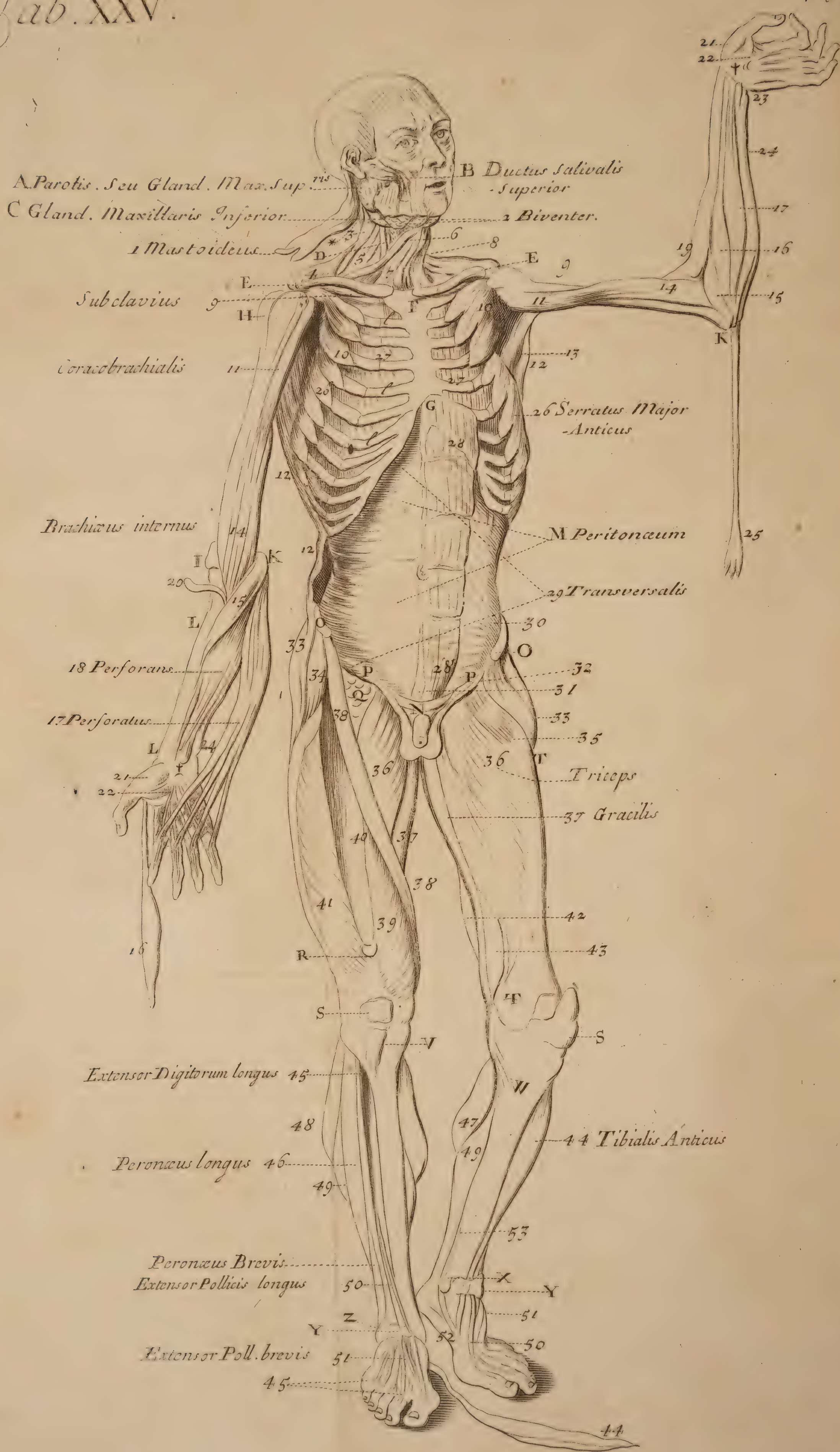
The Thumb is bent by two Muscles: The first arises from the Internal Protuberance of the *Humerus*, and from part of the *Radius* by different Orders of Fibres, and passing under the *Ligamentum Annulare*, is inserted into the third Bone of the Thumb. The second arises from the Bones of the *Carpus* and the Annular Ligament, and is inserted into the second Bone of the Thumb. These are call'd *Flexores Pollicis*.

It is extended by two Muscles, which are called *Longus* and *Brevis*.

Extensor
longus.
Tab. xxvi.
& xxvii.

The *Extensor longus* arises from the upper and external part of the *Ulna*, and passing over the Tendon of the *Radialis externus*, is inserted near the second Joint of the Thumb. This has two

Ten-





Tendons, and is separable into two Muscles, and is therefore frequently so reckon'd.

The *Brevis* springs from the *Ulna*, a little below the former, and is inserted into the third Bone of the Thumb. Brevis.
Tab. ib.

The *Abductor Pollicis*, call'd also *Thenar*, springs from the *Ligamentum Annulare* and first Bone of the *Carpus*, from whence passing to the Thumb, it makes that fleshy Body which is call'd *Mons Lunæ*, and draws the Thumb from the Fingers. Abductor
Pollicis.
Tab. xxiii.

The *Antithenar* springs from the Bone of the *Metacarpus*, that sustains the Bone of the Fore-finger, and is inserted into the fore-side of the first Bone, and draws the Thumb to the Finger. Antithe-
nar.
Tab. ib.

T A B. XXV.

Some of the Inferior Muscles that appear on the Fore-part of the Body after their Superior and External ones are remov'd.

The Muscles of the Face being referr'd to in the two preceding Tables, need no farther Explication in this.

A, The *Parotid*, or superior Maxillary Gland.

B, Its Salival Duct passing over the *Masseter* Muscle, before it goes through the *Buccinator*.

C, The inferior Maxillary Gland.

1, The *Musculus Mastoideus* rais'd from the *Sternum* and *Clavicula*, and left at its Termination behind the *Processus Mastoideus*.

2, The *Biventer*, or *Digastric* Muscle *in situ*.

3, Part of the *Levator Scapulae*.

* Part of the *Splenius*.

4, Part of the *Cucullaris* fix'd to the *Clavicle*.

5, Parts of the *Scaleni*.

6, The *Coracobyoideus* bared.

7, Part of the *Sternothyroideus*.

8, The *Sternobyoideus*.

D, the internal Jugular Vein.

EE, The *Claviculae*.

F, *Os Pectoris*, or *Sternum*.

G, The *Ensfiform Cartilage*.

H, A *Sulcus* in the *Os Humeri*, in which passes the Tendon of the External Head of the *Biceps*, here cut off.

I, The External Protuberance of the *Radius*.

K, The Internal—

LL, The *Radius*.

ll, The Cartilaginous endings of the Ribs.

M, The Tendon of the transverse Muscle of the

Abdomen, passing to the *Linea Alba* close upon the *Peritonæum*.

N, The *Os Pubis*.

O, The Spine of the *Os Ilium*.

PP, The Processes of the *Peritonæum* inclosing the *Spermatick Vessels*.

QQ, The *Glandulæ Inguinales*.

R, The Tendon of the *Rectus Femoris*, or *Tibiæ* cut off at its union with the two *Vasti*.

SS, The *Patellæ*.

TT, The Thigh-bone bared.

V, The Tendons of all the extending Muscles of the Thigh, between the *Patella* and its Termination on the upper part of the *Tibia*.

W, The *Tibia*, or larger Bone of the Leg.

X, The *Malleolus internus*, or inner Ankle bone.

Y, The *Ligamentum Annulare*.

Z, The *Malleolus externus*, or outward Ankle.

9, *Musculus Subclavius*.

10, *Serratus minor Anticus*.

11, *Corobrachialis*.

12, Part of the *Latissimus Dorsi* on both sides.

13, Part of the *Rotundus major*.

14, *Brachiæus internus*.

15, *Pronator Radii teres*.

16, *Radialis Flexor* in the right Hand hanging down to its Tendon.

17, *Perforatus* in both Arms; that in the Right being rais'd to shew the Slits in its Tendons, thro' which pass the Tendons of the

18, *Perforans*.

19, Part of the *Supinator Radii longus* in the left Arm.

20, The Tendon of the *Biceps*, that ends in the upper part of the *Radius*.

21, *Abductor Pollicis*.

22, *Flexor secundi Ossis Pollicis*.

23, *Abductor minimi Digiti*.

†† The *Ligamentum Annulare* in both Hands.

24, Part of the *Flexor Carpi Ulnaris*.

25, The *Palmaris longus* rais'd from its Termination, and hanging at its Origin, from the internal Protuberance of the *Os Humeri*.

26, The *Serratus major Anticus*, clear'd at its insertion into the Ribs on both sides.

27, The *Intercostales externi*.

28, 28, The *Rectus Abdominis* on the left side.

29, The *Transversalis Abdominis* with its Tendon passing on the *Peritonæum* M to the *Linea Alba*.

30, The *Obliquus ascendens in situ*.

31, The *Pyramidalis*.

32, The *Cremaster* Muscle descending from its Origin at the fore-part of the Spine of the *Os Ilium* on the *Processus Peritonæi* to the *Testes*.

33, The fore-parts of the *Gluteus medius* on both sides.

34, The *Musculus Membranosus* at its Origin from the Spine of the *Os Ilium*.

35, The *Pectinæus*.

36, The *Triceps* in both Thighs,

Thighs, that of the left being laid bare.

37, The *Gracilis*.

38, *Sartorius*.

39, *Vastus internus*.

40, The *Crureus*, as it appears after the *Rectus Femoris* is remov'd.

41, *Vastus Externus*.

42, Part of the *Seminervosus*.

43, Part of the *Seminembranosus*.

44, The *Tibialis Anticus* in situ, on the left Leg, and dissected, lying on the Ground from the Right.

45, 45, The *Extensor digitorum Pedis longus* in situ on the right Leg.

46, The *Peronæus longus*.

47, The *Gastrocnemius internus*.

48, The *Gastrocnemius externus*.

49, 49, Parts of the *Soleus* in both Legs.

50, *Extensor Pollicis longus*.

51, *Extensor Pollicis brevis* in both Feet.

52, *Abductor Pollicis*.

53, Part of the *Tibialis Posticus*.

C H A P. VII.

Of the BONES and MUSCLES which form the LOWER VENTER, or REGION of the TRUNK.

HAVING done with the first Region of the Trunk, and the Parts appended to, and moving upon it; we come to the second or lower: in which we shall consider the Parts of the Loins and the *Pelvis* at their bottom; and according to our usual Method, we shall first describe the Bones which are the true *Vertebræ* of the Loins, the spurious ones of the *Os Sacrum*, and *Ossa Innominata*.

The *Vertebræ* of the Loins are in number five, and are larger and thicker than those of the Neck or Back, and more loosely articulated one with another, for the more easy Inclination, or stooping of the Body downwards: They have the same Processes with the other *Vertebræ*, with this difference, that in these the Spinal Process is broader and thicker than elsewhere, and the trans-

Verte-
bræ of
the Loins.
Tab. xxi,
xxii.

transverse Process is longer, without any Perforation, as those of the Neck have; neither has the Body of the *Vertebra* any lateral *Sinus*, as those of the Back have, for the Reception of the Head of the Ribs. They are gradually larger, as they approach nearer to the *Os Sacrum*; which is indeed observable through the whole Track of the Spine, from the Head downwards, the lower being every where somewhat larger than the upper: But this Enlargement in the Loins is more remarkable than elsewhere, especially in the last *Vertebra* of all, which joins

Os Sacrum.

Tab. xxi,
xxii.

The *Os Sacrum*, which consists of six Bones; tho' sometimes it has been observ'd to have one more or one less. These are call'd *Vertebræ*, but spurious, and appear very distinct in Infants, but in Adults they generally coalesce, so as to seem but one Bone of an Equilateral triangular Figure with the *Basis* upwards, which is ty'd to the last *Vertebra* of the Loins, and laterally by long, thick and broad Processes, to the *Os Ilium* on either side: The exterior, or back-part of the *Os Sacrum* is rugged, and a little convex, the interior smooth and concave. It has ordinarily five Perforations on either side, which enlarging themselves backwards and forwards, are in a manner double, through which pass some of the Nerves which make the *Cauda Equina*, and are the Production of the Spinal Marrow, which has no farther Passage through the middle or great Perforation of the *Vertebræ*, than to the last of the Loins, these spurious of the *Os Sacrum* having no Hollow.

Foramina.
Tab. xxi,
& xxii.

Os Coccygis.

Tab. xxii.

To the lower Bone of the *Os Sacrum* is join'd the *Os Coccygis* consisting of three or four little Bones, and two Cartilages. It resembles a little Tail; the lower Bone, as in the *Os Sacrum*, growing gradually less than the upper, till it ends in a Cartilaginous Point, which is turn'd inwards for

for the convenience of sitting with Ease. These Bones are but loosely joyn'd together, especially in Women, in whom at the time of Parturition they easily give way, and are by skilful Midwives thrust back at that time, without damage ; but by the unskilful sometimes so rudely, as to cause excessive Pain in the time of Labour, and many ill Consequences after. This Bone serves to sustain the *Intestinum rectum*, and has Muscles in common with the *Anus*, to draw it upwards or inwards ; taken notice of by *Joannis Riolanus*, *Anthropograph. Lib. V. Cap. 40.* after describing the *Levatores Ani*, with the *Musculi transversales Penis*, which he thinks belongs to the *Anus*, he says, *Reperitur quintus Levator Ani, qui Coccygi & Ossis Sacri extremo affigitur.* These I call *Musculi Coccygis* : They arise broad and fleshy, from the *Os Ischium*, at the extremity and on each side a sharp Process of that Bone, that is between the *Musculi Marsupialis* and *Pyramiformis*, and terminate after an oblique descent on each side the *Os Coccygis*, and adjoining part of the *Os Sacrum* : When they act, they draw the *Os Coccygis* upwards and inwards, and are Antagonists to two Ligaments, that spring from the back-part of the *Os Sacrum*, and terminate in the external Surface of the *Os Coccygis*, which keeps that Bone from being thrust inwards on several occasions, particularly in riding on Horseback, &c.

Musculus
Coccygis.
Tab.
xxvii.

Liga-
menta.

The *Ossa Innominata* are two large Bones situated on either side of the *Os Sacrum*, and are called likewise *Ossa Coxæ & Coxendicis*, in *English*, the Hip Bones. In Infants each of these Bones consists of three distinct ones, separated by Cartilages, which in Adults grow up, and make but one firm solid Bone, whose Parts however retain three distinct Names, according to their former division.

Ossa In-
nominata.

The

Os Ilium.
Tab. xxii.

The upper and broader Part is call'd *Os Ilium*, from the Intestine of that Name, which lies in the inside of it, and is join'd to the *Os Sacrum* by a Cartilage, and a very strong membranous Ligament. The outward Rim of this Bone represents in Figure, a large Segment of a Circle, which is call'd the Spine of the *Ilium*. The back-edge of this Rim is call'd the *Dorsum*, and the inner *Costa*. In Women this Bone is much larger than in Men, and the Spine of each farther distant from one another.

Spina
Ilium.
Dorsum.
Costa.
Tab. ib.

Ischium.
Tab. ib.

The lower part of the *Innominatum* is call'd the *Ischium*, and by some peculiarly *Os Coxendicis*. The Cavity commonly said to be in this Bone, call'd *Acetabulum*, is fram'd at the meeting of this with the *Ilium* and *Os Pubis*, as appears in the *Fetus*; but in Adults no marks of this union appear in this large deep Cavity, in which the Head of the Thigh-bone is receiv'd; at the bottom of which lies a large mucilaginous Gland. It is lin'd and tip'd round with a Cartilage, whose circular Margin is call'd *Supercilium*. At its juncture with the *Os Pubis*, is the *Foramen Ischii & Pubis*, a large Hole common to it and that Bone; and at its lower end a large Protuberance, which serves us like a Stool to sit upon, and a little above it, on the hinder part, is another small acute Process, near which is a *Sinus*, that gives Passage to the Tendon of the *Obturator internus*.

Acetabulum.
App. 1.
Fig. vi.

Tab. xxii.
xxxvi.

Os Pubis.
Tab. xxi.
xxii.

The fore-part of the *Innominatum* is the *Os Pubis*, or *Pectinis*; which is thinner and lighter than the rest, and perforated as before-mentioned: This is joyn'd to its Fellow *per Synchondrosin*, or by an intermediate Cartilage, where in Women they form an Arch much larger than in Men: Besides this difference, we find the Spines of the *Os Ilium* stand at a greater distance from each other, and that Bone much flatter in Women than in Men.

All

All these Bones, which are larger and more concave in Women than in Men put together, form that Cavity in the bottom of the *Abdomen*, which is call'd the *Pelvis*; wherein lies in Men the Bladder of Urine, and part of the lower Intestines; and besides these, in Women the *Uterus*, who having for the convenience of the *Fætus*, a larger *Pelvis*, and wider opening below for the Passage of it, are therefore in proportion much larger about the Hips than Men.

Authors are very confus'd and perplex'd about the Muscles which move the Loins; probably upon the account of that great and various Motion which no other part of the Trunk has: The most distinct and best agreed account reduces them to four Pair: Two of which are common to them and the Back, and two proper, or serving for their Motion only.

The first of the common is the *Longissimus Dorfi*, which rises from the upper part of the *Os Sacrum*, *Os Ilium*, and the first *Vertebra* of the Loins, and in its beginning is confounded, if not the same with the *Sacrolumbalis*, describ'd among the Muscles of the Back. It runs upwards along the whole Track of the Back, and is connected to every transverse Process in its way, and ends sometimes in the first *Vertebra* of the Back, sometimes in the first of the Neck, and (as some Authors say) reaches now and then to the *Processus Mamillaris* of the *Os Petrosum*.

The *Semispinatus* rises from the Spines of the *Os Sacrum*, and in its Origin joyns the *Latissimus Dorfi*. It runs over all the *Vertebræ* of the Loins and Back, and sends a Tendon to every Spine, by which means it serves to erect the whole Trunk.

The *Muscular Sacer* has its Origin on the hinder part of the *Os Sacrum*, and runs along under the *Longissimus Dorfi*, and with its several Tendons lays hold on the Spine, and every transverse Process

Pelvis.
Tab. xxi.

Muscles of the Loins.

Longissimus Dorfi.
Tab. xxvii. iii.

Semispinatus.
Tab. ib.

Action.

Sacer.
App.
Tab. xlvii.
Fig. ii.

Action. Process of the Loins, and at the lowest of the Back, where it ends. This is likewise an *Erector*.

Quadrati.
Tab. ib. The Loins (besides the natural Tendency of the Trunk downwards from its proper weight) are bent by a Pair of Muscles call'd *Quadrati*, which arise broad and fleshy from the inner Margin or *Costa* of the *Ilium*, and from the *Os Sacrum*, and end in the transverse Processes of each *Vertebra* of the Loins, and the last of the Back. When either of these act separately, it bends the Body laterally; together they stoop it forwards.

Psoas parvus. The *Psoas Parvus* (tho' by most Authors reckon'd among the Muscles of the Thigh) belongs properly to this Part, and rises fleshy from the sides of the upper *Vertebrae* of the Loins, and is inserted into the *Os Innominatum*, at the Junction of the *Pubis* and *Ilium*, with a broad thin Tendon, which embraces the *Psoas* of the Thigh.

T A B. XXVI.

THE external Muscles on the back-parts.

- a, The *Os Jugale*.
- b, The *Parotid* Gland.
- c, The Spines of the *Vertebra* of the Back.
- d, The *Basis Scapulæ*.
- 1, The *Musculus Occipitalis*.
- 2, Part of the *Temporalis*.
- 3, *Elevator Auriculæ*.
- 4, *Zygomaticus*.
- 5, Parts of the *Splenius*.
- 6, Part of the *Masseter*.
- 7, Part of the *Mastoidæus*.
- 8, A small Portion of the *Elevator Scapulæ*.

- 9, The *Cucullaris*.
- ee, Its tendinous Part, that unites with its Partner.
- e, Another Tendon of the *Cucullaris*, that terminates in the *Spina Scapulæ* *.
- 10, The *Deltoides*.
- 11, *Infraspinalis*.
- 12, *Rotundus minor*.
- 13, *Rotundus major*.
- 14, *Gemellus*, or *Biceps externus*.
- 15, Part of the *Biceps*.
- 16, Part of the *Supinator Radii longus*.
- 17, *Extensor minimi Digiti*.
- 18, *Extensor Carpi Ulnaris*.
- 19, *Ra-*

a Os Jugale
b Glandula Parotis



1 Occipitalis

5 Splenius

9 Cucullaris

* Spina Scapulæ

10 Deltoides

11 Infra Spinalis

12 Rotundus minor

13 Major

14 Gemellus

19 Olecranon

+ Ligamentum Anulare

A Digitorum Flexor

27 Digitorum Flexor

26 Ulnaris Flexor carpi

c Spinæ Vêtebrarum Dorſi

d Basis Scapulæ

ee Cucullaris Tendines

ff Principium Tendinosum

Latissimi Dorſi

2 Temporalis

3 Elevator Auriculæ

4 Zygomaticus

6 Masseter

Mastoidæus

8 Elevator Scapulæ

Abductor pollicis ad dorsum manus

24 Abductor Indicis

25 Interossei

22 Abductor minimi digiti

21 Extensores Pollicis

20 Extensor Digiti Communis

19 Radialis extensor Carpi

18 Extensor Carpi Ulnaris

17 Minimi digiti Extensor

16 Supinator Radij longus

Anconæus A

29 Rhomboides parvus

30 Sacrolumbalis parvus

28 Latissimus Dorſi

31 Obliqui Descendentis portio

9 Spina Osis Ilij

32 Glutæus medius

33 maximus

34 Membranosus

35 Vastus externus

36 Tricipitis portio

37 Gracilis

38 Semimembranosus

39 Seminervosus

40 Biceps

h Nervus Popliteus

i Nervi Truncus

41 Gastrocnemius externus

42 internus

43 Peroneus primus

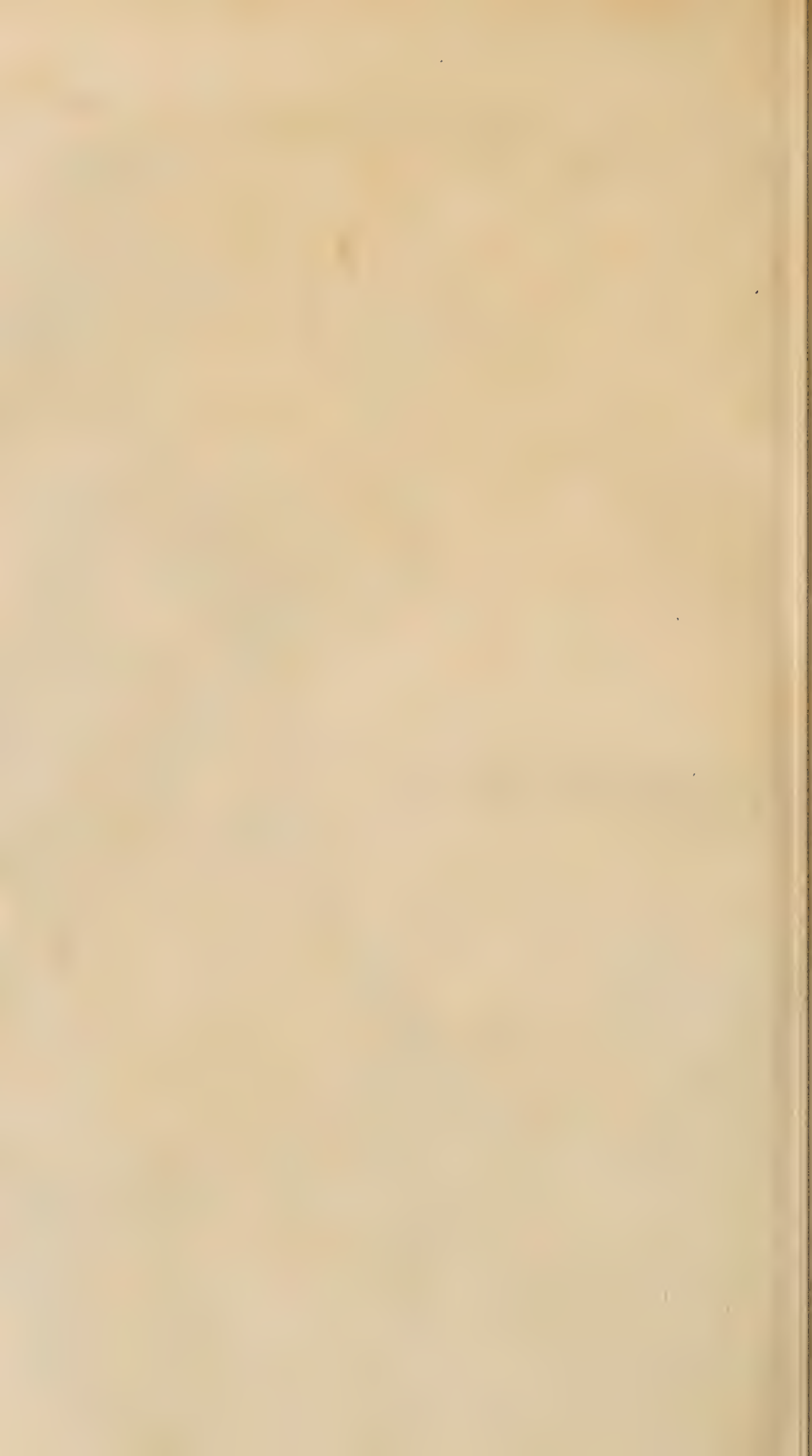
44 Secundus

k Malleolus externus

l internus

45 Abductor Minimi Digiti





19, *Radialis Extensor Carpi.*

20, *Extensor Digitorum communis.*

21, The Muscles extending the Thumb.

AA, The *Anconæus* in both Arms.

22, *Abductor minimi Digiti.*

23, *Interossei.*

24, *Abductor Indicis.*

25, *Abductor Pollicis ad Dorsum Manûs.*

26, Parts of the *Ulnaris Flexor Carpi* in both Arms.

†, The *Ligamentum Annulare.*

27, Part of the *Flexor Digitorum Perforatus* in the left Arm.

28, The *Latissimus Dorsi.*

ff, Its thin Tendon, which springs from the *Vertebræ* of the Back, Loins, and *Os Sacrum*, under which are the Beginnings of the *Musculi Sacrolumbalis*, and *Dorsi longissimus.*

g, The Spine of the *Os Ilium*

29, 29, Parts of the *Rhomboides*, near the lower Angles of each *Scapula.*

30, 30, Portions of the *Sacrolumbales* and *Dorsi lon-*

gissimi seen in the triangular *Interstice* here express'd.

31, 31, Parts of the oblique descending Muscles of the *Abdomen.*

32, Parts of the *Glutæus medius.*

33, The *Glutæus maximus.*

34, A small Portion of the *Membranosus.*

35, *Vastus externus.*

36, Portions of the *Triceps.*

37, The *Gracilis*, only seen in the right Thigh.

38, The *Semimembranosus.*

39, *Seminervosus.*

40, *Biceps.*

h, The Trunk of Nerves and Blood-Vessels passing the Ham.

i, The Trunk of a Nerve marching with the Tendon of the *Biceps Femoris.*

41, 41, The *Gastrocnemius externus* and *internus.*

42, *Solæus.*

43, *Peronæus primus.*

44, *Peronæus secundus.*

k, The *Malleolus externus.*

l, The *Malleolus internus.*

45, The *Musculus Abductor minimi Digiti.*

C H A P. VIII.

Of the BONES and MUSCLES of the THIGH, LEG,
and FOOT.

Os Fe-
moris.
Tab. xxii.

THE Thigh has but one Bone, which is the largest and longest of the whole Body, exceeding the *Os Humeri* in length about a third, and in thickness more. It is call'd *Os Femoris*, and sometimes simply *Femur*. It is pretty much incurvated, the convex part being before, and the concave behind. It has three *Epiphyses*, which in Children are so distinct from the Bone as to be easily separable.

Epiphy-
ses.
Tab. ib.

Head.

The first of these is the largest and most prominent, and has a large round Head, capp'd with a Cartilage, which is receiv'd into the *Acetabulum* or Socket, at the *Ischium* or *Os Coxendicis*;

Ligaments.

to which it is fastned by two Ligaments: One broad, thick, and membranous, surrounding the whole Edge of the *Acetabulum*, and Head of the Bone: The other short, thick, and round, springing from the bottom of the *Acetabulum*, by the side of the Mucilaginous Gland, (which is here the most considerable of the whole Body) and is inserted into the middle of the Cartilaginous Head. The *Epiphysis*, or Neck of the Bone on which this Head is seated, springs laterally from the upper end of the Bone, by which means the Thighs are kept at a greater Distance than otherwise they would be, and thereby make more room in those Parts for several necessary Purposes.

Neck.
Tab. xxii.

Trochan-
ter major.
Tab. xxii.

The second Process or *Epiphysis*, is situated at the bottom of the Neck, and the outside of the Thigh-bone, and is called *Trochanter*, or *Rotator major*. It has a small *Sinus*, in which are inserted

ed

ed the *Quadrageminus* and *Oblurator* Muscles.

The third *Epiphysis* is on the hind-part of the Bone, somewhat lower and less than the former, and is called *Trochanter minor*. The Surface of both these *Epiphyses* is somewhat asperous, for the better hold of divers Muscles which are inserted into them.

The Body of the Bone is very hard, consisting of many *Laminæ*, or Plates of Bone, with interspers'd *Cellulæ*, or *Loculi*, of which we have spoken more particularly in the general Description of the Bones. It has within the longest and largest Hollow of any of the Bones fill'd with Marrow, the use and manner of whose Conveyance has been already spoken to. On the outside it has a small Ridge, which runs along it on the back-side, from one end to the other, where Muscles are inserted, and is call'd *Linea Aspera*.

At the lower end it has two pretty large round Processes, (improperly by some call'd Heads, from the resemblance in Figure to the true Head) each cover'd with a Cartilage, between which is a large deep *Sinus*, by means of which it is articulated with the *Tibia* by a true *Ginglymus*, this *Sinus* receiving the Process in the middle of the Head of the *Tibia*.

The Leg, from the Knee to the Foot, is call'd *Tibia*, and consists of two Bones; the inner whereof is not much inferior in length or bigness to the *Femur*. It is a large, hard, angular Bone, with a Cavity in the middle, tho' but small for the bigness of the Bone. It has three edges or corners, which render it in a manner three square; the foremost of which is the most acute, and is call'd the Shin: At the upper end it has two large *Sinus*, or Cavities, cover'd with a soft smooth Cartilage, call'd *Lunata*; these *Sinus* receive the two lower Processes of the *Femur*, and are divided by an intermediate Process, which enters the Si-

nus at the lower end of the *Femur* before spoken of ; so making a true *Ginglymus*, each Bone receiving and being received.

Patella.

Tab. xxi.

This Joynt, which is call'd the Knee, is cover'd on the middle of the fore-part by a pretty round Bone on the outside, somewhat of the Figure of a Shield, about two Inches Diameter, somewhat convex on both sides, but most on the outer, and cover'd with a smooth Cartilage. This Bone is call'd *Patella*, *Mola*, and *Rotula*, in *English* the Knee-Pan : Over it slides the Tendons of the Muscles, that extend the Legs as upon a *Trocklea* or Pully ; but its more peculiar use is to hinder the Leg from being bent forwards in Extension, as it necessarily must be in this sort of Articulation, if this Bone did not, like a Bolster, check its rolling too forwards, as the *Olecranium* does the Swing of the *Cubitus* too backwards in the Extension of that Joynt, by catching in the *Sinus* of the *Humerus*, and stopping it there. In an erect Posture, when one Foot is set forward, the whole weight of the Body above bears upon the *Patella*, which in that situation hinders the Knee from bending backwards, and straining the Muscles that inflect it behind ; which the weight of the Body, added to the force of the extending Muscles, must otherwise necessarily occasion ; as in going down Hill, where the Body must necessarily rest upon the extended Foot, which is set foremost till the other be brought forwards. Hence *Galen's* Wrestler, who had dislocated his *Patella*, found so much Pain and Trouble in going down Hill.

Offa Sesamoidea.

There are sometimes found two *Offa Sesamoidea*, in the two beginnings of the *Gastrocnemius externus* Muscle, but these are rarely met with, and only in aged Bodies.

Muscles of the Thigh.

Having thus far describ'd the *Tibia* and *Patella*, only to shew the lower Articulation of the *Femur*,

Femur, we shall return to the Muscles which move the Thigh, and proceed in our usual Method.

The Number of Muscles which move the *Thigh*, is variously reported by Authors, who have been pleas'd to split and join Muscles arbitrarily, as they thought fit: But the Number most generally agreed on is nine; tho' two of these being again sub-divided, the *Triceps* into three, and the *Quadrigeminus* into four, they make in all fourteen. Some of these serve to bend the Thigh, others to extend it; some to draw it inwards, others outwards; and several of them acting together to give it a rotatory Motion, which this Joynt has, tho' not so conspicuous as the *Humerus*.

The first of the *Flexors* is the *Psoas major*, or *Psoas major Lumbaris*; which is a round, hard, fleshy Muscle, arising from the transverse Processes of all the *Vertebræ* of the Loins, and passing along on each side of the *Vertebræ*, runs over the superior part of the *Os Sacrum*, and Spine of the *Ilium*, and is inserted into the lower part of the lesser *Trochanter*. Psoas major. App. Tab. xlv. Fig. i.

The *Iliacus internus* arises fleshy from the concave part of the inside of the *Ilium*, and in its Descent joins with the *Psoas*, and is inserted with it. Iliacus internus. Ibid.

The *Pectineus*, so call'd from its Origination at the external part of the *Os Pectinis*, rises thick, broad, and fleshy, and is inserted on the hinder-part of the *Femur*, a little below the lesser *Trochanter*. These three Muscles conspire to draw up the Thigh. Pectineus. Tab. xxv. Action.

The *Glutæi* are three Muscles of the same Name, which co-operate in extending the Thigh: The first, which is call'd *Major*, arises semicircular from the *Os Coccygis*, the Spines of the *Sacrum*, and the Spine of the *Ilium*; whence form-

ing a large fleshy Muscle, it descends to the *Linea Aspera*, four Fingers breadth below the great *Trochanter*.

Glutæus
medius.
Ibid.

The *Glutæus medius* arises fleshy from the external part of the Spine of the *Ilium*, and is inserted by a strong short Tendon, into the superior external part of the great *Trochanter*.

Glutæus
minor.
Tab.
xxvii.

The *Minor* lies under the former, and arises semicircular, broad, and fleshy from the *Dorsum Ilii*, and ends at the upper part of the great *Trochanter*. These three Muscles together make the Flesh of the Buttocks.

Triceps.
Tab. xxv.

The *Triceps* is properly three Muscles, which spring all from the *Os Pubis*: One at its Junction at the *Ischium*, another from the middle, and the third from the lower part; and are inserted all, one above another, into the *Linea Aspera*, of which they take up the greater part; the lower reaching to the lower *Apophysis* of the Thigh-Bone inwards. These are the *Adductores*, and draw the Thighs together.

Action.

Quadri-
geminus.

The next is the *Quadrigeminus*, which consists likewise of four Muscles, which turn the Thigh outwards.

Pyriformis.
Tab.
xxvii.

The first of these is the *Pyriformis*, or *Iliacus externus*, which arises from the internal concave part of the *Os Sacrum*, towards the bottom, and descending obliquely along the great *Sinus* of the *Os Ilium*, from a round fleshy Origin, joyns the *Glutæus medius*, and is inserted by a round Tendon at the bottom of the great *Trochanter*.

Gemini.

The second and third are call'd *Gemini*. They arise from the *Os Pubis* and *Ischium*, and the Ligament that spreads over the great *Foramen*, and being broad and fleshy, are by Authors divided into the *Marsupialis*; so call'd from an imaginary resemblance of a Purse: The other *Obturator internus*, not from its use, but from its running over and covering the great *Foramen*. They are both

Marsu-
pialis.
Tab.
xxvii.
Obtura-
tor inter-
nus.

both inserted into the *Sinus*, at the bottom of the great *Trochanter*.

The fourth is the *Quadratus*, which rises from the *Apophysis* of the *Ischium*, and maintains an equal breadth and bulk to its Insertion, just below the great *Trochanter* on the outside.

The last is the *Obturator externus*, nam'd likewise from its Situation. It arises fleshy from the exterior Margin of the *Os Pubis* and *Ischium*, and is inserted tendinous at the Root of the great *Trochanter*.

Some Authors have describ'd another *Obturator internus*, but they seem to have been confounded by the different Names and ways of describing that have been used by Anatomists, and to mean only that part of the *Marsupialis*, which Mr. *Cowper* has call'd *Obturator internus*. But we leave this to the Decision of farther Enquiry.

The Head of the *Tibia*, and its Articulation with the *Femur*, has been already describ'd, the better to give an Idea of their Motion together: For the same Reason the *Patella* likewise has been describ'd, that we might not be obliged to return to that Articulation.

The lower end of the *Tibia* is much smaller than the upper, and has a considerable Process which forms the inner Ankle; and a pretty large *Sinus*, divided in the middle by a Process, which is receiv'd into the concave part, or *Sinus* of the *Astragalus*, as its *Sinus* receives the convex Part of the same Bone.

The Leg consists likewise of another Bone, which is call'd *Perone*, *Fibula*, *Sura*, and *Focile minus*; which lies on the outside of the Leg, and is join'd at the upper end to the *Tibia*, just below the Knee, by a *Sinus*, which receives the lateral Protuberance of the upper end of the *Tibia*. Its lower end is receiv'd into a *Sinus* of the *Tibia*, and then shoots out into a large Process,

Quadratus.
Ibid.

Obturator externus.
Ibid.

Lower end of the Tibia.

Malleolus internus.
Tab. xxi.

Fibula.
Ibid.

Malleolus
externus.
Ibid.

which makes the outer Ankle, and embraces the outside of the *Astragalus*. The *Tibia* and *Fibula* touch one another only at their Extremities, like the *Radius* and *Cubitus*, and are join'd *per Arthrodiam*: Besides which, they are ty'd together by a strong membranous Ligament, which fills up the Cavity between the two Bones. On the inside of this outer Ankle is a *Sinus*, to which answers a Protuberance in the *Talus*.

Muscles.

The *Tibia*, or Leg, is bent by four hinder Muscles, extended by four: It is moved inwards by one, and outwards by two.

Biceps.
Tibiæ.
Tab.xxvi.

The Muscles that bend the Knee, are, first the *Biceps*, which is a double-headed Muscle: The first of whose Heads arises with a round Tendon from the Protuberance of the *Ischium*, and becoming fleshy after about half its Progress, is join'd by the other from the *Linea Aspera* of the *Femur*. The Bellies of this Muscle are likewise distinct, which joining at last in a Tail or Tendon, are inserted into the hinder-part, or upper *Apophysis* of the *Fibula*.

Seminervosus.
Ibid.

The *Seminervosus* arises half fleshy, half tendinous, near the former, and is inserted by a round Tendon into the internal *Epiphysis* of the *Tibia*.

Semimembranosus.
Ibid.

The *Semimembranosus* arises from the same Eminence of the *Ischium*, a little higher, and is inserted by a short thick Tendon into the upper and back part of the *Tibia*.

Gracilis.
Tab. xxv.

The *Gracilis*, so call'd from its being the slenderest of these Muscles, arises from the Juncture of the *Os Pubis* and *Ischium*, and is inserted into the upper and inner side of the *Tibia*. These four bend the Knee.

Action.

The Leg is extended likewise by four Muscles; which are the *Rectus*, the two *Vasti*, and the *Crureus*.

Rectus.
Tab.xxiii,
xxiv.

The *Rectus* rises with a sharp beginning, from a Protuberance a little below the Margin of the Spine

Spine of the *Ilium*, between that and the *Acetabulum*. It runs with a smooth Belly between the two *Vasti*, and becoming gradually tendinous, ends at the Protuberance of the *Patella*, a little below the Knee.

The *Vasti* are two, *Externus* and *Internus*, so nam'd from their largeness, by a barbarous *Latin* Term.

The *Vastus externus* springs from the Root of *Vastus* the great *Trochanter*, and from the *Linea Aspera*, externus. Tab.xxiii, xxiv, xxv. outwardly tendinous, and inwardly fleshy, and descending obliquely forwards becomes *vice versa* tendinous internally, and fleshy externally, till meeting with the Tendon of the former, it grows entirely tendinous, and is inserted together with it.

The *Vastus internus* arises likewise partly tendinous, and partly fleshy, from the *Linea Aspera*, Internus. Ibid. immediately below the lesser *Trochanter*, upon the outside of the Bone, and is continued almost to the lower *Apophysis* of the same Bone on the inside, whence it descends obliquely almost semi-circularly, and growing tendinous, at once joins and is inserted with the former.

The *Crureus*, so call'd from its situation on the *Crureus.* Thigh, like the *Brachius* on the Arm, is the Tab. xxv. last of the *Extensores*. It arises from the fore-part of the Thigh-Bone, between the *Trochanters*, and runs down the whole length of the Bone, and joining its Tendon to the rest, is inserted together with them.

These all serve to extend the Leg, and though *Action.* from their several Originations they have different Names, may be as reasonably accounted one Polyventer Muscle, as many others of the Body are.

The Leg is moved obliquely inwards and outwards by three Muscles.

Longus.

Tab. xxiii.
xxv.

That which draws inwards is call'd *Longus*, or *Sartorius*, from the use *Tailors*, who sit cross-legg'd, make of it. It is call'd likewise *Fascialis*, from its running over the other Muscles of the Leg and Thigh like a Swathe. It arises from the Fore-part of the Spine of the *Os Ilium*, and descending obliquely inwards, runs over the *Rectus*, and *Vastus internus*, and part of the *Triceps*, and a little below the middle of the inside of the Thigh meets with the *Gracilis*, from whence it runs tendinous over the inferior internal Head of the Thigh-Bone, under a covering of the *Fascia lata*, and is inserted about four Fingers breadth below the Head of the *Tibia*, on its inside forwards. It brings the Legs together and across.

Action.

Poplitæus.

Tab. xxvii.

The *Poplitæus*, or *Subpoplitæus*, arises with a short strong Tendon from the external inferior Protuberance of the Thigh-Bone, and running obliquely cross the Joint, is inserted broad into the upper part of the *Tibia*, on the inside, a little below its upper *Apophysis*. It not only antagonizes the *Tailors* Muscle, but assists the Benders likewise.

Action.

Membranofus, or
Fascia
lata.

Tab. xxiv.

The *Membranofus*, or *Fascia lata*, arises fleshy from the Fore-part of the Spine of the *Ilium*, but soon becomes membranous, and covers almost all the Muscles of the Thigh and Leg down to the Foot, and in its Action turns the Leg outwards.

Action.

Parts of
the Foot.

The Foot is divided into three Parts, the *Tarsus*, *Metatarsus*, and *Digiti* or Toes.

Tarsus.

Tab. xxi.

The *Tarsus*, is that Space which is between the Ankle and the Body of the Foot, call'd *Metatarsus*, and answers to the Wrist in the Hand. It consists of seven Bones.

Talus.

Ibid.

The first is called *Talus*, or *Astragalus*, or *Os Balistæ*: This Bone has, as it were, six Sides or Faces. The upper Face of it is partly convex, partly concave, and cover'd with a Cartilage.

Its

Its Head is receiv'd into the *Sinus*, at the lower end of the *Tibia*, and its Hollow receives the small Protuberance of that Bone. The lateral Faces of it are in a manner plain, and are connected to the Processes of the *Tibia* and *Fibula*, which makes the Ankles. The fore-part is gibbous, and is receiv'd into a *Sinus* of the *Os Naviculare*. The hind-part is sinuous, and receives part of the *Calcaneum*, or Bone of the Heel: On the under-side, on the hinder-part, it has a pretty large *Sinus*, which receives the upper and hinder part of the *Calx*; and towards the fore-part of the same side it has a Protuberance, which is received into a *Sinus* of the same Bone; so that on both sides this little Bone is articulated by a *Ginglymus*: On the upper, to the *Fosile majus*, or *Tibia*; on the under, with the *Calcaneum*; and laterally *per Arthrodiem*, or slight Connexion.

The next is the *Calx*, *Calcaneum*, *Calcar Pedis*, which is the biggest and thickest of all the Bones of the Foot. It lies under the *Astragalus*, to which it is articulated, as already describ'd. On the hinder-part it has a large Protuberance, into which is inserted the great Tendon of the *Gastrocnemii*, or *Chorda Achillis*. On the fore-part it has a Cavity which receives the *Os Cubiforme*; on the inside it has a notable *Sinus*, through which runs the Arteries, Veins, and Nerves, with the Tendons that move the Foot inwards, and bend the Toes; and between that and the *Astragalus*, towards the *Metatarsus*, is a Cavity, in which lies a mucilaginous Gland, with Fat for the Lubrication of the Cartilages and Tendons.

The third is the *Naviculare*, or *Scaphoides*, which lies between the *Astragalus* and the *Ossa Cubiformia*. On the hinder-part it has a large *Sinus*, which receives the fore-head of the *Talus*; and

Calx.
Tab. xxii,

Navicu-
lare.
Ibld.

and on its fore-part it is divided into three small Heads, which are receiv'd into so many *Sinus* in the hinder-part of the cuneiforme Bones.

Offa Cuneiformia
Tab. xxi.

The *Offa Cuneiformia* are in Number three, and are generally by Authors call'd *Innominata*, but nam'd *Cuneiformia* by *Fallopious*, from their Figure, which is thick on the upper part, with a *Sinus* in each ; on the under part thin. They are join'd as before-said to the *Astragalus*, and at the fore-end to the Bones of the *Metatarsus*. They are of unequal Bigness ; that at the side of the great Toe being the biggest, that at the opposite side next in size, and the middle one least : On the upper side they are convex, on the under a little concave, to favour the Tendons that lie under.

Cuboides.
Tab. xxii.

The last Bone of the *Tarsus* is the Cubiforme, of a Figure irregularly cubical. It is rang'd along the *Cuneiformia*, on the side of the Foot : Behind, it is join'd to the *Os Calcis* ; before, to the two outward Bones of the *Metatarsus* ; and on the inside to the third *Os Cuneiforme*.

Metatarsus.
Tab. xxi.

The Bones of the *Metatarsus* are in number five ; whereof the first, or innermost, which sustains the great Toe, is much thicker than any of the rest ; that next to it is the longest ; from which, to the outward, they grow gradually shorter. They are longer than the Bones of the *Metacarpus*, in other things they resemble them, both as to Figure, and manner of Articulation. The first three are join'd to the Cuneiforme Bones, the other two to the *Cuboides*.

T A B. XVII.

DIvers Muscles which appear after the external Muscles, represented in the preceding Table, are taken off.

N. B. The opposite Figure

annex'd, (or Out-line) as it's call'd) having the Names of all the Parts written on it, 'tis needless to add any farther Explication of this Table.

The

Tab. XXVII.

a. Os Bregmatis pag. 442

b. Occipitis

c. Fugale

d. Clavicula

e. Spina Scapulæ

f. dorsum Scapulæ

g. Os Humeri



Complexi pars

Splenius

Supra spinatus

Serratus sup. Posticus

infraspinatus

Rotundus minor

Rotundus major

Gemellus

Supinator Radij longus

Supinator Rad: brevis

Anconæus

Flexores Digitorum

Extensores Pollicis

Indicator

Interossei

Pectinalis

portio

6. Obturator externus

Vastus internus

k. l. Vertebrae dorsi Spinæ

† Processus Transversales

l. m. Lumborum Spinæ.

m. Os Sacrum.

n. Os Coccygis.

oo. Ligamenta.

p. Os Ischii Appendix.

q. Trochanter major.

r. Linea aspera

t. Os Calcis.

Peronæus Secundus







The Bones of the Toes are in number Fourteen; in every respect like those of the Fingers, except that the *Pollex Pedis* consists of but two Bones, and is so seated as to be longer than the other Toes, contrary to the Thumb, which is so plac'd as to appear shorter than the Fingers; and that the second *Phalanx* of all the rest of the Toes are extremely short.

*Bones of
the Toes.
Tab. xxi.*

There are twelve *Sesamoidea* belonging to the Toes, and seated as in the Fingers.

*Sesamoi-
dea.*

The Bones of the Feet are ty'd together by several Ligaments; the most considerable whereof, and which only we shall have occasion often to mention by Name in the Description of the Muscles of the Foot, is the *Ligamentum Annulare*; which in all respects so resembles that of the *Carpus*, that it needs no other Description.

*Ligamen-
tum An-
nulare.
Tab. xxiv.*

The Foot is extended by three Muscles, or, according to some, by four.

*Muscles of
the Tarsus
& Meta-
tarsus.*

The first of these is the *Gastrocnemius*, or *Suralis externus* and *Gemellus*; which arises fleshy with two Heads from both Processes of the Thigh-bone in the Ham, which joyning together, constitute one great fleshy Belly, which makes the outer part of the *Sura*, or Calf of the Leg, below which they become tendinous: Some divide this Muscle into two, upon the score of its two Heads; calling that which rises from the outer Process *Externus*, and the other *Internus*, retaining thereby the usual Division, yet multiplying the number of the Muscles.

*Gastroc-
nemius
externus.
Tab. xxvi.*

The next is the *Plantaris*, which rises fleshy from the outer Tubercle of the lower *Epiphysis* of the Thigh-bone, and after letting down a little way a short slender Belly, runs in a slender Tendon between the *Gastrocnemii*, marching along with their Tendon, and proceeding onwards to the bottom of the Foot over the *Os Calcis*, expands it self under the *Soal*, upon the *Musculus Perfo-*

*Plantaris.
App.
Tab. xlv.
Fig. vi.*

Perforatus, to which it adheres closely, as the *Palmaris* does in the Hand. Some reckon this among the Extenders of the Foot.

Gastrocnemius
internus.
Tab. xxvi.

The *Gastrocnemius*, or *Suralis internus*, by some call'd *Soleus*, from its resemblance in Shape to a Soal-Fish, arises fleshy from the external Process of the *Fibula*, and from the back-part of the *Tibia*, and dilates it self into a large fleshy Belly, which makes the inner part of the Calf of the Leg, under which it is gather'd into a strong Tendon, and closely uniting with the Tendon of the *Suralis externus*, make the great Tendon, or *Chorda Achillis*, which is inserted into the *Calcaneum*, and is, as has been before observ'd, by much the greatest and strongest Tendon of the Body, whose Wounds are said to be very dangerous. These Muscles extend the Foot, and by their extraordinary Strength enable the Feet to sustain the weight of the whole Body, under which they would otherwise be apt to bend.

Vid. Phil.
Transact.
Vol. 21.
Nº. 252.

The Muscles which bend the Feet are two.

Tibialis
Anticus.
Tab. xxiii,
xxiv.

The *Tibialis Anticus* springs from the exterior Process of the *Tibia*, and becoming gradually broad and fleshy about the middle of the *Tibia*, along the fore-part of which it runs, is contracted again into a slender smooth Tendon, which passes under the *Ligamentum Annulare*, and is partly inserted to the *Os Cuneiforme majus*, and partly to the Bone of the *Metatarsus*, that supports the great Toe. This draws the Foot up.

Peronæus
Anticus.
Tab. xxiv.

Peronæus Anticus, *Longus* or *Primus*, begins tendinous, and fleshy from the Head and upper half to the middle of the *Perone*, or *Fibula*, and running (as it were in a Pully) through the Channel on the hinder-part of the outer Ankle-bone, is inserted into the upper end of the Bone of the *Metatarsus*, which joins the great Toe.

This draws the Foot upwards.

Tibialis, or *Tibæus Posticus* derives it self from both Bones of the *Tibia*, and from the Ligament that binds them together, and runs with a smooth strong Tendon, through the *Sinus* on the inner *Malleolus* (as on a *Trochlea*) under the Annular Ligament to the inside of the *Os Naviculare*: This is the *Adductor*, and draws the Foot inwards: From the use Sailors make of it in climbing it is sometimes call'd *Nauticus*.

Peronæus Posticus, or *Secundus*, call'd sometimes *Semifibulæus*, from a fleshy sharp Origin in the back part of the *Perone*, continues down the outer Ridge of the Bone, till a little below the middle, whence forming a smooth, strong, flat Tendon, it runs through the same Channel at the bottom of the *Malleolus externus* with the *Longus* to the outside of the *Os Metatarsi* of the little Toe.

The Muscles of the Toes resemble those of the Fingers so exactly in Number, Figure, Use and Name, that a bare enumeration with a reference to the Hand might suffice to give an Idea of them.

Perforatus Sublimis, or *Flexor Brevis* arises from the inner and lower part of the *Calcaneum*, and sends a Tendon to every Bone of the second *Phalanx* of every one of the four lesser Toes. In this (as in the *Perforatus* of the Fingers) there is a slit in each Tendon about the first Joint, which lets through the Tendon of the *Perforans*.

Which is call'd also *Flexor tertii Internodii Digitorum Pedis*, and *Flexor magnus*, and springs from the hinder part of the *Tibia* and *Fibula*, near their Junction. It runs under the inner Ankle, and through the *Sinus* of the *Os Calcis*, where there is a fleshy Mass, which joyns it, whence some have not unreasonably fixt one Origin of it here. It is divided into four Tendons, which runs thro' the slits in the *Perforatus* to the third *Phalanx* of the Toes.

The Extenders of the Toes are nam'd *Longus* and *Brevis*.

Extensor
Longus.
Tab. xxiii,
xxiv, xxv.

The *Extensor Longus* derives it self from the forepart of the upper *Epiphysis* of the *Tibia*, near the *Fibula*, and growing tendinous about the middle of it, runs in four Tendons under the Annular Ligament, to the third Bone of every Toe, except the *Pollex*.

Extensor
Brevis.
Tab. xxiv.

The *Extensor Brevis* comes from the exterior and forepart of the *Calcaneum*, and goes to the second Joint of the Toes.

Lumbricales.
App.
Tab. xliv.
Fig. vii.

The *Lumbricales* are four, and arise (as in the Hand) one from each Tendon of the *Profundus*. They go to the inside of each of the lesser Toes.

Interossei.
Ib. Fig. ix.

The *Interossei* of the *Metatarsus* in Number, Use, Figure, Origin and Insertion, answer exactly those of the same Name in the *Metacarpus*.

Abductor
minimi
Digiti.
Tab. xxiv.

The *Abductor minimi Digiti* is a Muscle proper to the little Toe only, arising from the outside of the *Os Calcis*, near the exterior Bone of the *Metatarsus*, and is inserted laterally into the outside of the second Bone of that Toe.

Transversalis.
App.
Tab. xliv.
Fig. viii.

The *Transversalis Pedis* springs from the first Joint of the *Pollex*, near the *Os Sesamoideum*, and is inserted into the Bone, that supports that next to the little Toe. It keeps the Toes together.

Musculi
Pollicis.

Most Anatomists allow but four Muscles to the Thumb, but Mr. *Cowper* makes out six; assigning two Benders, and two Extenders; whereas others mention but one of each. But I choose to follow him who writes from *Autopsy*, and his own Inquiries. What therefore he has observ'd to appear constantly and regularly, I have nowhere scrupled to receive.

Extensor
Pollicis
Longus.
Tab. xxv.

The *Extensor Pollicis Longus* rises large and fleshy, from the forepart of the *Fibula* from a little below its upper Process, to within four Fingers breadth of the lower, whence passing under the

the *Ligamentum Annulare*, it is inserted into the upper part of the second Bone of the great Toe.

The *Extensor Brevis* springs fleshy from the fore-part of the *Os Calcis*, and after a short Belly, is contracted into a slender Tendon, which running obliquely over the upper part of the Foot, is inserted into the second Bone of the *Pollex*.

Extensor
Brevis.
Tab.
xxiii,
xxiv, xxv.

The *Flexor Pollicis Longus* is deriv'd from the back-part of the *Fibula*, with a double order of Fibres, and runs tendinous under the inner Ankle, and thro' the Channel in the inner part of the Bone of the Heel, to its insertion at the extremity of the great Toe on the under side.

Flexor
Pollicis
Longus.
App.
Tab. xlv.
Fig. vi.

The *Flexor Brevis* arises from the middle *Cuneiform* Bone. It is short, thick and fleshy, seemingly two, and running over the Termination of the *Peronæus*, has a double insertion into the *Ossa Sesamoidea*, which are themselves fastned to the second Bone of the Toe.

Flexor
Brevis.
Tab. ib.
Fig. viii.

The *Abductor*, or *Thenar* springs from the inside of the *Os Calcis*, and from the *Os Cuneiforme majus*, and is inserted into the outside of the exterior *Os Sesamoideum Pollicis*, and draws the great Toe from the rest, which is at most but an obscure, or small Motion.

Abductor
Pollicis.
Tab. xxiii,
xxiv, xxv.

The *Adductor*, or *Antithenar* comes from the third *Os Cuneiforme*, and is inserted into the inside of the inner *Os Sesamoideum* of the great Toe.

Adductor
Pollicis.
App.
Tab. xlv.
Fig. viii.

If, in this Account of the Muscles, the Inquisitive Reader falls short of that Satisfaction which he might propose to himself by a longer and more distinct Account; what is here wanting, will be amply supply'd by another Edition of Mr. *Cowper's Myotomia Reformata*, which that indefatigably inquisitive Anatomist, the Ornament of his Profession, is now preparing for the Press; where-

in

in the curious Reader will not only be gratify'd with an exact Description at large, but an elegant Figure of every Muscle in a Human Body, either of which it was not to the purpose of this Work to give. However, short as it is, I hope those that shall begin their Study in Anatomy with this Book, shall not be misled, nor the skilful Diffectors find much to reprehend; which will satisfy the Writer, whose utmost Ambition it is to spend his Time harmlessly, and not altogether unprofitably, even to others. He is not so vain, as to hope to escape Censure; that is the Lot of much greater Perfections than he will ever pretend to: He expects it, even from those who reap the Benefit of his Labours, which has been his Portion hitherto. But if the few Candid and Ingenuous accept his Attempt, he will think himself over-paid, and heartily wish well to those that will do better.



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APPENDIX.

T A B. I.

Divers Views of the external, middle, and internal Compages of the Fibres of the Heart.

FIG. I.



HEWS the fore part of the Heart, next the *Sternum*.

A, The inferior Trunk of the *Vena Cava*.

B, The *Arteria Pulmonalis*.

CCC, The *Vena Pulmonalis*, with its Branches tied up.

D, The *Arteria Magna*.

a, The *Ligamentum Arteriosum*, between the pulmonick Artery, and the *Aorta*.

b, The Trunk of the *Arteria Coronalis*.

E, The right Auricle dis-

tended, to shew the Series of its muscular Fibres.

F, The left Auricle.

G, The oblique descending Progress of the muscular Fibres of the right Ventricle of the Heart.

H, the oblique ascending Progress of the carnosus Fibres of the left Ventricle.

II, The tendinous Union of both these on the *Septum* of the Heart.

FIG. II.

Shews the back part of the Heart next the *Vertebrae*.

a

A, The

A, The lower, or ascending Trunk of the *Vena Cava*.

aa, The circular Fibres appearing on its inside.

B, A Portion of the upper, or descending Trunk of the *Cava*.

b, The *Vena Coronaria*.

C, The *Vena Azygos* tied up, where it discharges itself into the *Cava*.

DD, The right Auricle, representing the various Disposition of its Fibres.

E, Part of the Root of the left Auricle *in Situ*.

G, The muscular Fibres on the bulbous Trunk of the *Vena Pulmonalis*.

FF, Two of its Ramifications from the Lungs, tied up.

H, The Fibres of the right Ventricle.

I, Those of the left Ventricle.

KK, Their tendinous Union on the *Septum Cordis*.

L, The *Foramen Ovale*, somewhat appearing.

FIG. III.

Shews the Series of Fibres under those represented in Fig. I.

A, Part of the *Arteria Pulmonalis*.

B, A Portion of the *Aorta*.

C, The Fibres of the left,

D, Those of the right Ventricle of the Heart.

EE, The tendinous Union of the carnos Fibres of both Ventricles.

FIG. IV.

Shews the Fibres, as they ap-

pear under those express'd in Fig. II.

A, Part of the *Aorta*.

B, The tendinous Union of the Fibres of both Ventricles.

FIG. V.

Shews the double spiral order of the Fibres at the Cone of the Heart, which may partly be seen in Fig. III.

A, Part of the *Arteria Pulmonica*.

B, The Contortion of the Fibres, at the Cone of the Heart.

CD, The tendinous Union of both Ventricles.

FIG. VI.

Shews a view of the internal Surface of the Cone of the Heart, after a transverse Section.

A, The Bottom of the right Ventricle.

B, That of the left.

C, The Thickness of the Sides of the right Ventricle.

D, That of the left.

E, A Thread, supporting the tendinous Fibres, that pass from one Side of the left Ventricle to the other.

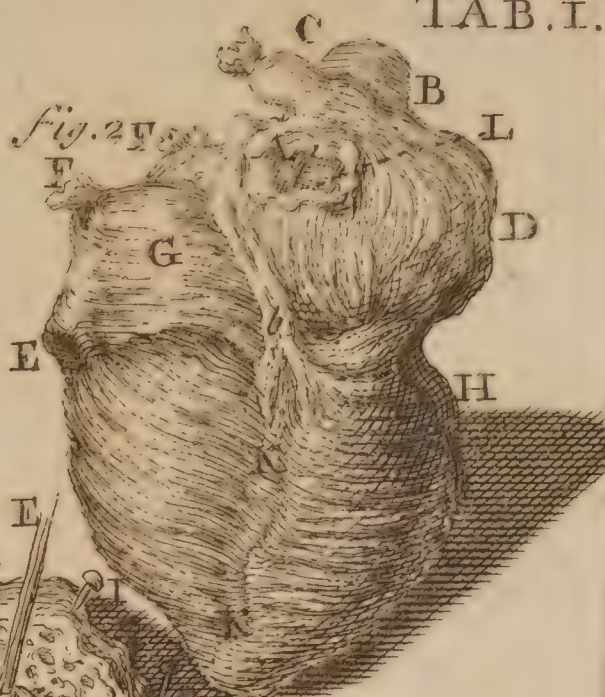
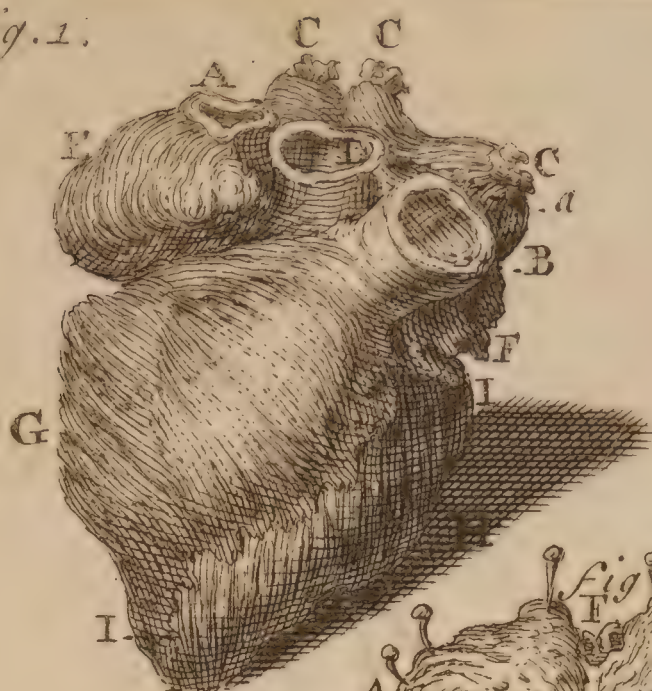
F, The Trunks of the coronary Vein and Artery divided.

G, The tendinous Union of both Ventricles.

FIG. VII.

Shews the right Auricle and Ventricle of the Heart, opened from the *Vena Cava*.

A, The



A, The Body of the Heart, with its Blood-Vessels filled with Wax.

a, Its Cone.

BB, The ascending Trunk of the *Vena Cava* opened.

bb, That part of the right Auricle, that is divided from the ascending Trunk of the *Cava*.

C, The descending Trunk of the *Cava*, also opened and expanded.

c, The Orifices of Veins, that bring Blood from the Auricles and Trunks of Blood-Vessels at the Basis of the Heart.

DD, The inside of the right Auricle.

d, A small *Semilunar Valve*, as it appears in the lower Trunk of the *Vena Cava* in this Position.

EEE, The Sides of the right Ventricle divided.

F, One of the carnosus Columns, to which the *Tricuspid Valve* is fastned.

f, Some fleshy Fibres passing from the inside of the Ventricle of the *Tricuspid Valve*.

GG, The *Tricuspid Valve*, as it appeared in this Position.

H, A Valve pinn'd up, at the Orifice of the coronary Vein.

II, A bended Probe, passing through the *Foramen Ovale*, K, into the *Vena Pulmonalis*, L, which remained open in this Subject, who died consumptive about thirty Years of Age.

MM, A Blacklead Pencil, supporting the *Tricuspid Valve*, and passing out at the right Branch of the *Arteria Pulmonalis*, N.

O, The left Branch of the *Arteria Pulmonalis*.

P, Divers carnosus Fibres, which arising from the *Septum Cordis*, pass to the opposite Side of the right Ventricle, and draw it close to the *Septum* when the Heart is in *Systole*.

T A B. II.

FIG. I. After Caspar Bauhin, the II, III, IV, V, and VIth. after Bartholin; the VIIth. from Dr. Lower, All which Figures are here revers'd.

FIG. I.

SHews the conjunction of the *Vena Cava*, with the Vein of the Lungs, in a *Fœtus*.

A, The Body of the Heart.

B, The descending Trunk of the *Vena Cava*.

C, The ascending Trunk.

DF, The *Arteria Magna*.

E, The *Axillary Artery*.

G, The right Auricle.

H, The *Anastomosis* between the *Vena Cava*, and Vein of the Lungs, called the *Foramen Ovale*, which is closed with a Valve, in the Adult.

FIG. II.

Represents the *Canalis Arteriosus*, between the *Arteria Pulmonalis*, and great Artery in a *Fœtus*.

A, The Heart.

B, The Trunk of the *Arteria Magna*.

C, A Portion of the great Artery which passes downwards.

D, The Artery of the Lungs arising from the Heart.

EE, The arterious Canal between the Artery of the Lungs and *Aorta*.

FFG, The Trunks of the Arteries, which pass to the Head, Arms, &c.

FIG. III.

The right Ventricle of the Heart, opened from the *Vena Cava*, to shew the three tricuspid Valves, AAA.

FIG. IV.

The right Ventricle of the Heart, opened from the *Arteria Pulmonalis*, to shew the three semilunary Valves, B,B,B.

FIG. V.

The left Ventricle of the Heart, opened from the *Vena Pulmonalis*, to shew the two mitral Valves, that at DD, being divided.

FIG. VI.

The same Ventricle opened from the *Arteria Magna*, to shew the three semilunary Valves, E,E,E.

FIG. VII.

Demonstrates, why the Blood which comes from the jugular Veins, does not descend into the *Vena Cava*, but goes into the right Auricle of the Heart.

A, The descending Trunk of the *Vena Cava*.

B, The ascending Trunk.

C, A Tubercle, according to Dr. Lower, which hinders the Blood of the superior Trunk from incommoding of that of the inferior, and directs it into the right Auricle and Ventricle of the Heart.

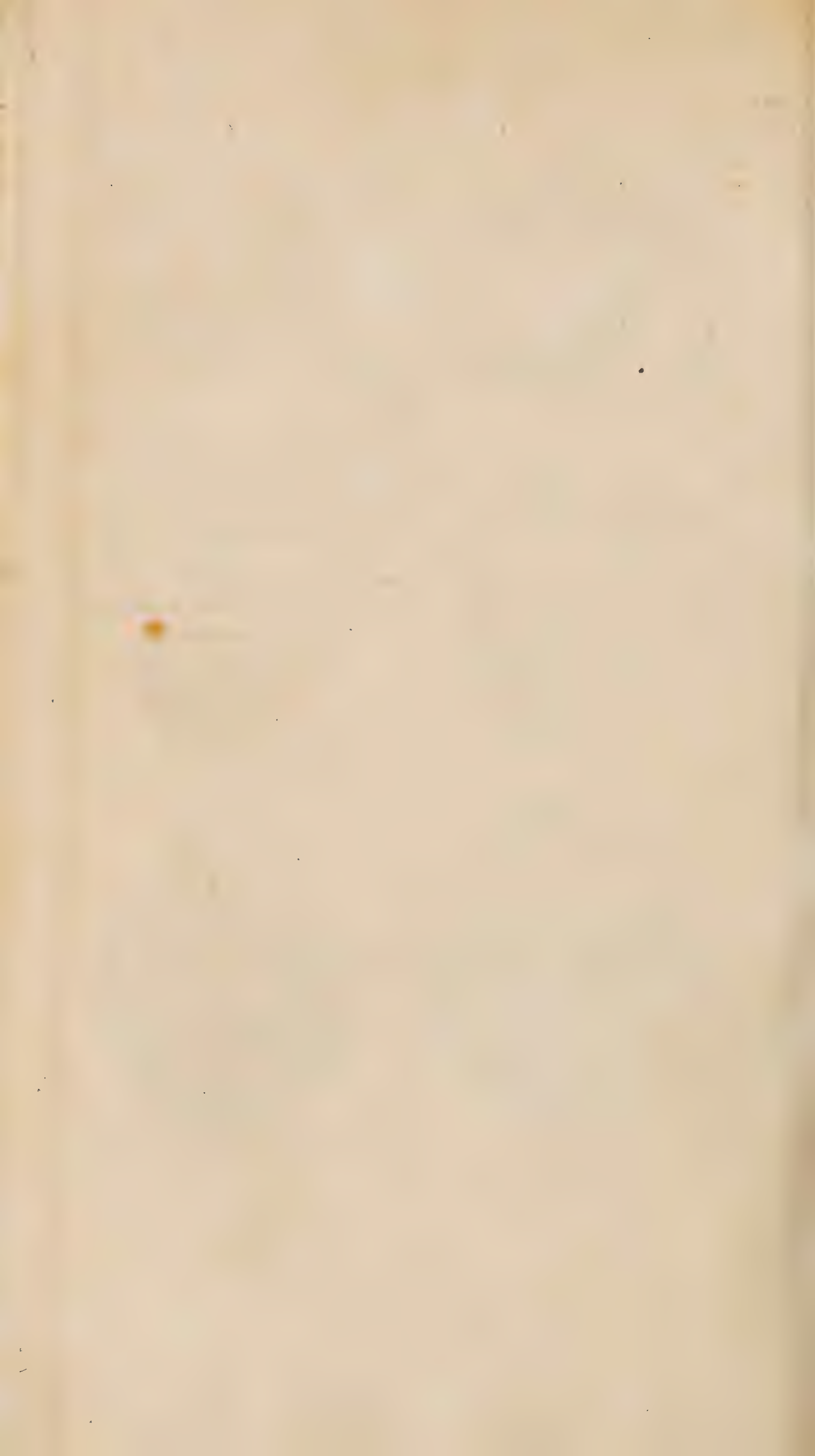
D, The right Auricle.

E, The *Foramen Ovale*, between the *Vena Cava*, and *Vena Pulmonalis*, clos'd with a Valve.

FG, The Heart, with its coronary Vessels.

N. B. This Stricture of the Trunks of the *Vena Cava*, at their Entrance into the right Auricle of the Heart, is peculiar to some Quadrupeds, and is not found in human Bodies; tho' Anatomists, after Dr. Lower, have generally ascribed it to them.





T A B. III.

FIG. I. From Bartholin, IVth. and Vth. from Dr. Willis, VIth. and VIIth. from Kerkringius.

FIG. I.

T H E principal Branches of the *Vena Cava* freed from the whole Body, revers'd in this Copy.

A, The Trunk of the *Vena Cava*, below the Heart.

B, Its Trunk above the Heart.

C, Its Aperture into the right Auricle.

DD, The subclavian Branches.

ee, The *Vena Mammariæ*, which descend under the *Sternum*.

f, The Vein of the *Mediaſti-num*.

gg, The Cervical Veins.

h, The Vertebrales.

iiii, The external Jugulars.

kk, The internal. ———

llll, The *Vena Azygos*.

mm, The *Intercoſtales Superiores*.

nn, The *Phrenicæ*.

oooo, The Branches of the *Vena Cava* in the Liver.

p, The internal Scapulary.

q, The external. ———

r, The superior thoracick Branch.

s, The inferior. ———

T, The *Vena Cephalica*.

U, Its external Branch.

x, The internal, which partly makes the *Mediana*.

zz, The *Vena Baſilica*.

tt, Its first Trunk.

uu, The external Branch of its second Trunk.

ww, The internal Branch of its second Trunk.

xx, Its third Trunk, which makes the other Part of the median Vein.

yy, The *Salvatella*.

The following Characters are placed on Veins below the *Diaphragme* and *Liver*.

AA, The *Emulgentes* or *Renales*.

BB, The spermatick Veins.

cc, The Veins which arise from the *Capsula Renales*.

dddd, *Vena Lumbares*.

EE, The iliac Branches.

ff, The superior Branch from the Muscles.

gg, The Veins of the *Os Sacrum*.

HH, The external iliac Branch.

II, The internal.

kk, The middle Branches from the Muscles.

LL, The epigastrick Veins.

mmm, The hypogastrick.

nn, The lower Branches from the Muscles.

o, The *Vena Pudenda*.

PP, The crural Trunk.

Qqq, The *Vena Saphena*.

rr, The lesser ischiatick Vein.

Sss, The Veins arising from the Muscles.

tt, The *Popliteæ*.

uu, The *Suralis*.

xx, The greater ischiatick Vein.

FIG. II.

Part of the Trunk of the great Artery, turn'd inside out.

AA, The internal nervous Tunick, which perhaps is somewhat musculous, consisting of streight or longitudinal Fibres, which serve to shorten the Tube of the Artery.

B, The musculous Tunick consisting of musculous Fibres, which contracting, drive on the Blood.

cc, The glandulous Tunick, which (like that of the Intestines) is placed under the musculous, and is composed of innumerable small Glands.

D, The external vasculous Tunick, or vesiculous, which is made up with Blood Vessels and nervous Fibres, variously complicated and contorted like Network.

FIG. III.

The Trunk of a large Vein dissected.

AA, The external Tunick (which is somewhat muscular) consisting of nervous Fibres, that are extended according to its Length, altho' their Series is not regular.

BC, The vasculous and glandulous Tunick, like that of the Artery.

D, The internal muscular Tunick, composed of circular Fibres, like that of the Artery, which, by their contraction, serve to hasten the Return of the Blood to the Heart.

FIG. IV, and V.

Shew the Membranes of the *Wind-pipe*, separated from each other.

D, The external Membrane, which is partly cartilaginous, and partly muscular; the transverse or annular Fibres of which, are placed in the *Interstitia* of the Cartilages, and tye them together.

AA, The glandulous Membrane, and BB, the vasculous, which is thought, by some, not to differ from that of the Blood-Vessels, and Intestines.

C, The internal Tunick, with streight muscular Fibres.

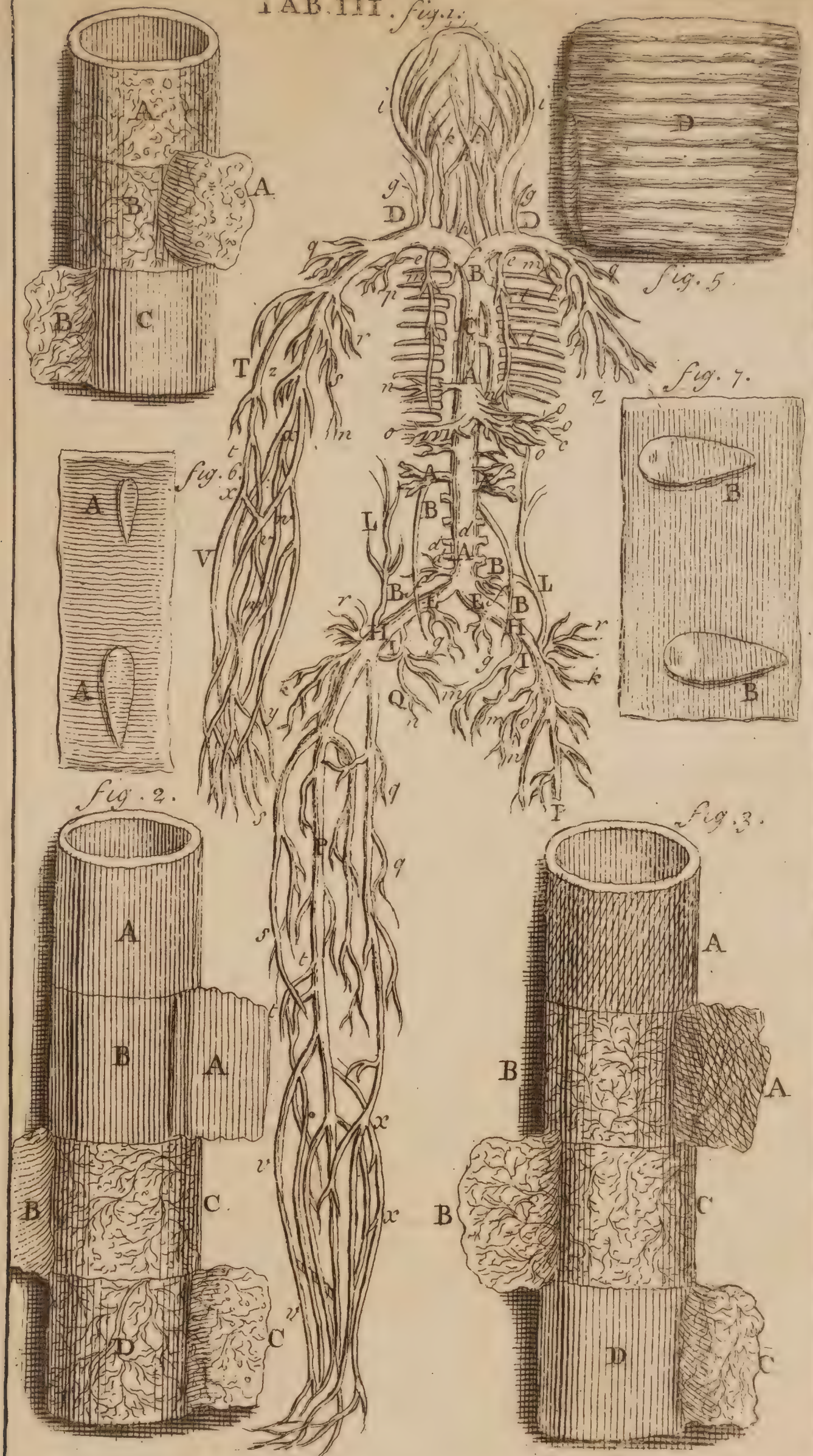
FIG. VI. and VII.

Part of the *vena cava*, open'd to shew the pyriformal Valves (AA) placed at the Orifices of the Veins, at their Entrance into the *cava*.

FIG. VII.

BB, The pyramidal Valves in the *vena cava* of an Horse.

TAB. III. *fig. 1.*





T A B. IV.

FIG. I, II, and III. from Dr. Willis; the IVth. from Dr. Lower; the Vth and VIth from Bartholin; the rest from Kerkringius.

FIG. I.

Shews the communication between the lateral *Sinus*, and internal jugular Vein on one Side, with the *Diverticulum*.

A, The lateral *Sinus* descending.

B, That part of the *Sinus* where it passes out of the Skull, and begins to dilate itself into the bulbous Part.

C, The bulbous Part, call'd *Diverticulum*, at the beginning of the internal Jugular; which is received in a peculiar Cavity on the *Basis* of the Skull, and serves as well to divert the quick Descent of the Blood, as prevent its Regurgitation from the internal jugular Vein into the *Sinus* in coughing, &c.

D, The beginning of the jugular Vein.

FIG. II.

Shews the vertebral Veins; with the upper Part of the *Sinus Vertebralis*, and the Communication between them and the lateral *Sinus* and Jugulars; as also all the Divarications of the spinal *Sinus*.

A, The third *Sinus* of the Head, called *Longitudinalis*, cut off, where it passes into the lateral *Sinus*.

BB, The lateral *Sinus*.

CC, The *Diverticulum*, where the lateral *Sinus's* end in the jugular Veins.

DD, The jugular Veins.

E, The upper communications of the vertebral *Sinus*.

FF. The *Sinus vertebralis* on both Sides within the *Cranium*, communicating with the lateral *Sinus*.

GG, The Trunk of the vertebral Veins on both Sides, which empty themselves into the subclavian Veins.

hhh, The *Anastomosis* on both Sides, lying on the Articulations of the Vertebra, between the vertebral Vein and *Sinus*.

iii, Small Veins which lie on the fore Parts of the *Vertebrae*, and communicate between the two vertebral Veins.

KK, The Communications of the *Sinus's*, and all the Veins on the Top of the Spine.

LL, Two venous Ducts, by which the last mentioned Communications are made.

mm, The commissures of the *Sinus's*, on both Sides, according to the *Internodia* of the *vertebrae*.

nn, The venous Ducts, which carry the Blood from the spinal Marrow into the *Sinus*.

ooo, The Veins which bring Blood into the Vertebrals from

the Muscles of the Neck, cut short.

pp, Other venous Ducts likewise, which are continued with the *Vena Azygos*, and lumbal Branches of the *Vena cava*, by which, if Wax or Wind is injected into the Trunk of the *Vena cava*, below the Diaphragme, either will pass (as it were) back again into the *Vena Azygos* and lateral *Sinus's* within the Skull.

FIG. III.

Shews the Trunk of the carotid Artery, before it enters the Surface of the Brain. N. B. The Contortions of this Artery differ very much in a human Body, from what is represented in this Figure; which appears to be done from the carotid Artery of some Quadruped.

A, The Trunk of the Artery, ascending towards the *Cranium*.

B, The same, whilst it is inclosed within the Bone, and covered with its borrowed Coats.

BC, The bending of the Artery, within the *Sinus* of the Skull, representing a double turn'd S.

D, The Trunk of it passing towards the Brain.

EEE, The Membrane inclosing the Artery in the *Sinus* of the Skull.

FIG. IV.

This Figure is here revers'd.

AAA, The ascending Trunks of the Arteries which pass to the Head and Arms.

B, The bending Trunk of the *Aorta*.

C, The Orifices of the ascending Trunks of the Arteries, looking towards the Heart, the better to receive the Blood impell'd from thence, before it passes into descending Trunks.

D, The descending Canal of the *Aorta*.

FIG. V.

The single Valves that appear looking upwards, in the *Basilick* Vein.

FIG. VI.

Shews the double Valves, which appear in the crural Vein, when opened.

FIG. VII.

Shews the Valves of the jugular Veins.

A, The human jugular Vein.

B, A three-fold Valve, where it joins with the subclavian Vein.

C, Another three-fold Valve, near the former.

D, A third three-fold Valve, three Fingers distance from the second.

FIG. VIII.

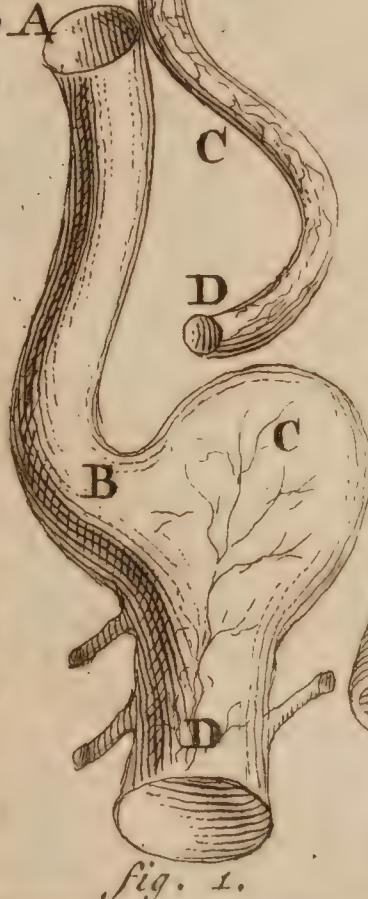
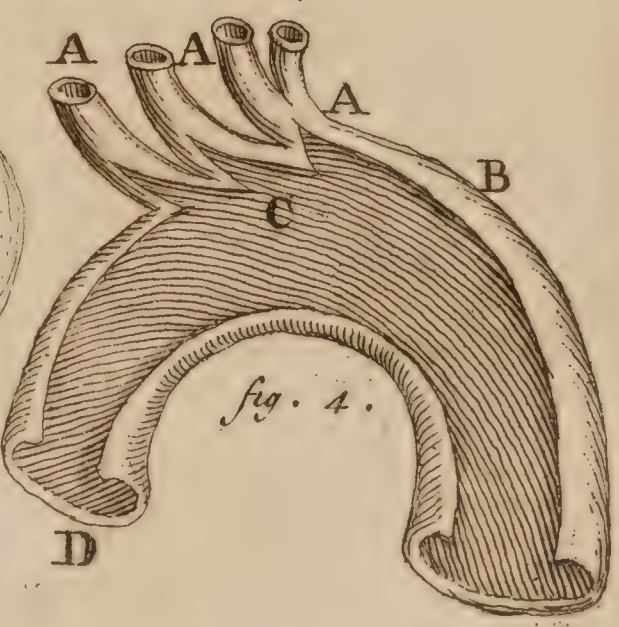
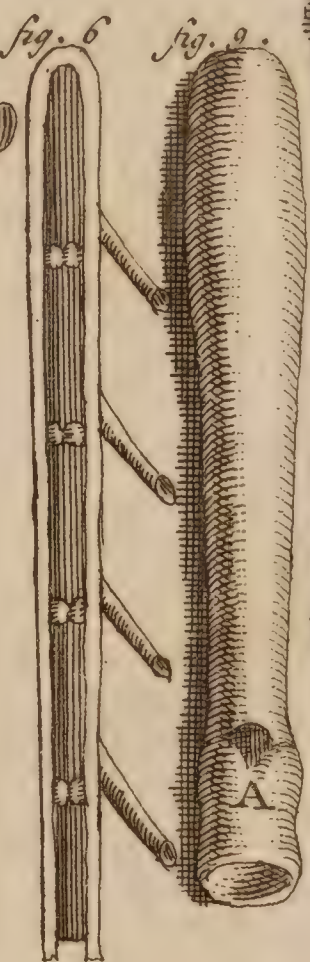
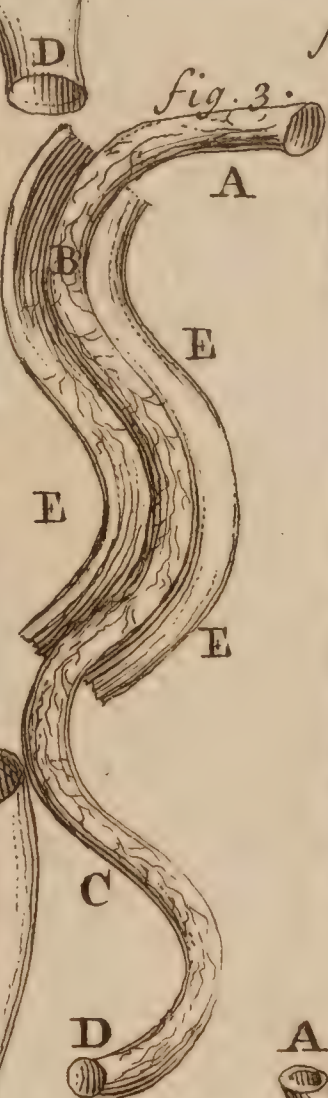
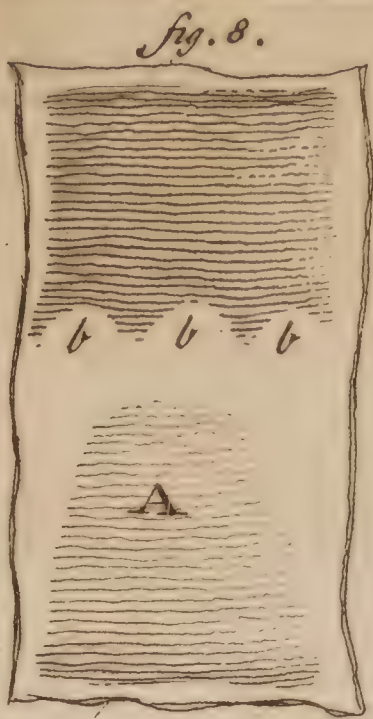
A, The jugular Vein opened to shew the three Valves.

bbb, The three Valves.

FIG. IX.

A, The three Valves in the jugular Vein of a Boy.

T A B.



T A B. V.

FIG. I.

THis monstrous Figure of the Arteries of a Humane Foetus, is Copy'd from Bidloo, but revers'd in this Print by Blancard, whose Description take as follows.

A, The beginning of the Great Artery, arising from the Heart.

a, The ascending Trunk, from which arises CC, the subclavian Arteries, dd, the Carotides, which again produce ee, the external Branch; ff the internal Branch. gg, The vertebral Arteries, or Cervical. hh, The Musculæ. ii, The Mammariæ. kk, The Intercostrales superiores. ll, The internal Scapulary. mm, The external. nn, The Superior Thoracick branch. oo, The inferior. pp, The Axillary branch. Qqq, Its superior branch, passing along the Arm, to the Carpus. Rr, Its inferior branch, passing in like manner to the Hand.

The following Characters are placed on the Arteries, which arise from the descending Trunk.

B, The descending Trunk of the Artery. aaa, The inferior Intercostralis. b, The Artery Phrenica. C, Arteria Coeliaca; d, Its right branch: e, Its left branch or Arteria Splenica dispers'd with small branches thro' the Spleen. f, The right Gastrick Artery. g, The Gastric

Epiploica. h, The Arteria Epiploica. kk, The Arteria Mesenterica superior. ll, The Arteria Renales. mm, Testiculares. nn, Lumbares. oo, The inferior Mesenterick Artery. pp, The branches of the Iliac Arteries. QQ, The external Iliac. rr, The internal. s, The Arteria Sacra. tt, The Hypogastrick, which pass to the Rectum, and the Pudenda. vv, The Hypogastricks which go to the Uterus. xx, The Umbilical Arteries. zz, The Epigastriæ. cc, The Arteria Pudendæ. ii, The Arteries that pass to the Muscles. uu. The Arteries of the external Muscles of the Thigh. ww, Those of the internal Muscles. xx. A branch of the Arteria Poplitea. yy, Those of the Calf. NN, The branches which go to the Feet and Toes.

FIG. II.

Shews the Semilunary Valves of the Aorta, and the passing out of the Coronary Arteries of the Heart; from Dr. Lower.

AA, Part of the left Ventricle of the Heart open'd.

bbb, The three Semilunary Valves, express'd very loose, as when the Blood passes out of the Heart.

C, The Trunk of the Aorta open'd.

dd, The Orifices of the two Coro-

Coronary Arteries, immediately without the Valves.

ee, The root of the *Aorta*, where it is united with the Tendon of the Heart.

FF, The Mitral Membranes divided and brought forwards on each side.

FIG. III.

Shews the Semilunary Valves, as they appear when they hinder the return of the Blood from the *Aorta*; by Dr. Lower.

AA, The *Aorta* cut off next the *Basis* of the Heart.

BBB, The three Semilunary Valves, mutually touching each other.

CC, The two Coronary Arteries.

FIG. IV.

Shews the manner how the Carotid and Vertebral Arteries, ascend into the Skull, from Dr. Lower.

AA, The two Carotid Arteries, where they enter the Bone of the Skull.

BB, That part of them, which is inclosed in the Body of the Bone.

CC, Those parts which pass by the sides of the *Sella Turcica* before they reach the Brain.

DD, The Vertebral Arteries where they pass into the Skull.

EE, Their Union into one Trunk, which is again divided and joined by small branches with the Carotids.

T A B. VI.

Both from Kerkringius, but revers'd in these Prints.

FIG. I.

THE Ramifications of the *Vena Porta*, within the Liver.

A, The place where the *Vena Porta* enters the Liver, shewing its *Foramen*, when cut from its other part.

BB, & c, The five principal great branches of the *Porta*, within the Liver.

C, The Umbilical Vein turn'd into a Ligament.

D, The *Canalis Venosus*, be-

tween the *Vena Porta* and *Cava*, also turn'd into a Ligament.

EEE, The Extremities of the Capillary Veins.

FIG. II.

The Ramifications of the *Vena Cava* within the Liver.

A. The Trunk of the *Vena Cava*.

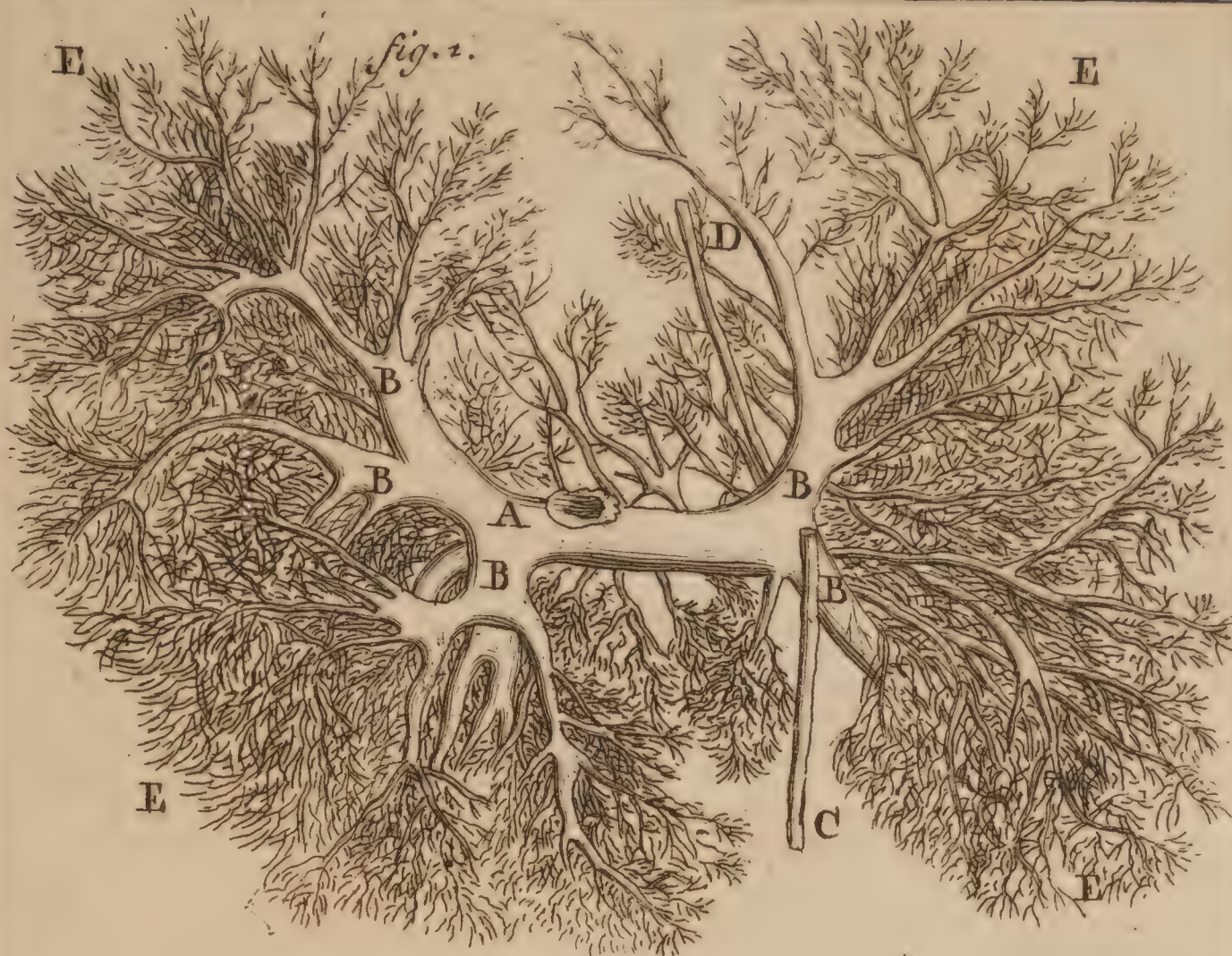
B, Part of the Diaphragm.

CCC, The three chief branches, which are again divided into others.

DDD, The extremities of the Capillary veins.

T A B.





TAB. VI.

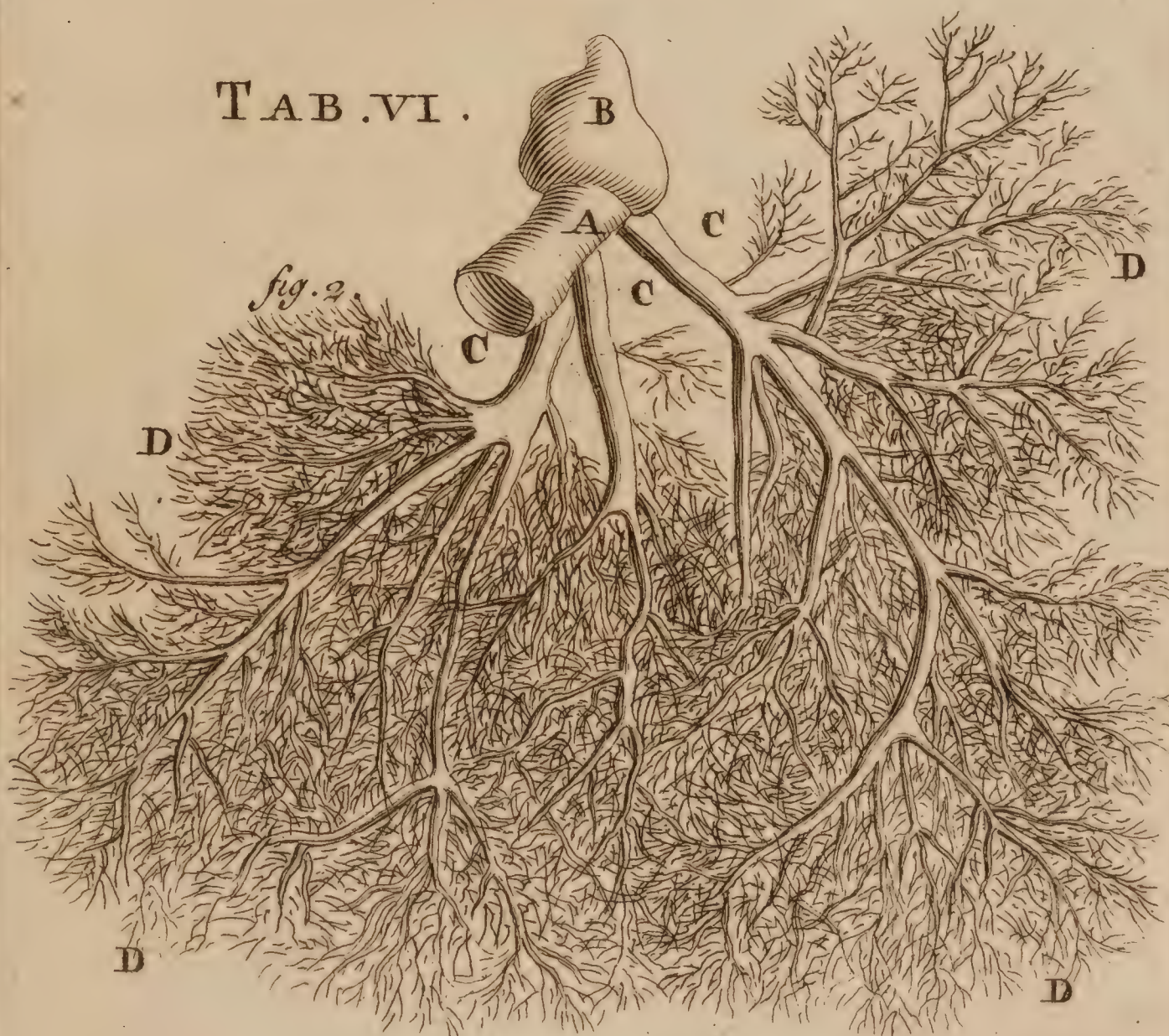


FIG. VIII.

Shews part of the outward Membrane, which covers the whole substance of the Lungs, which by means of the multiplicity, and variety of vessels terminating into it, seems in a manner punch'd thro' with innumerable little Holes, and by the windings of the Blood Vessels, whose Capillaries running along its inner Surface, encompass the Globular Vesicles, divided into a multitude of irregular Squares of unequal sides.

FIG. IX.

Shews a Portion of the external Membrane, separated with the broken-off clusters of Vessels, and without the squares, only with the small Cells (which are the divided Air Bladders) and appear against the Light as if prick'd through.

FIG. X.

The external Face of the *Thyroide*, or *Scutiform* Cartilage.

FIG. XI.

Shews the back part and superior Surface of the *Cricoides*, or Ring-like Cartilage.

FIG. XII.

The Arytenoidal Cartilages.

FIG. XIII.

The *Epiglottis*.

FIG. the XIVth. is done for the fore-part of the *Larynx* with its Muscles, all which are so very ill express'd, as well as the same parts (as is pretended) on the back part of the *Larynx*. FIG. XV. and will rather confound than inform the Learner; wherefore we shall pass them by.

FIG. XVI.

The *Thyroide* Cartilage, together with its Muscles.

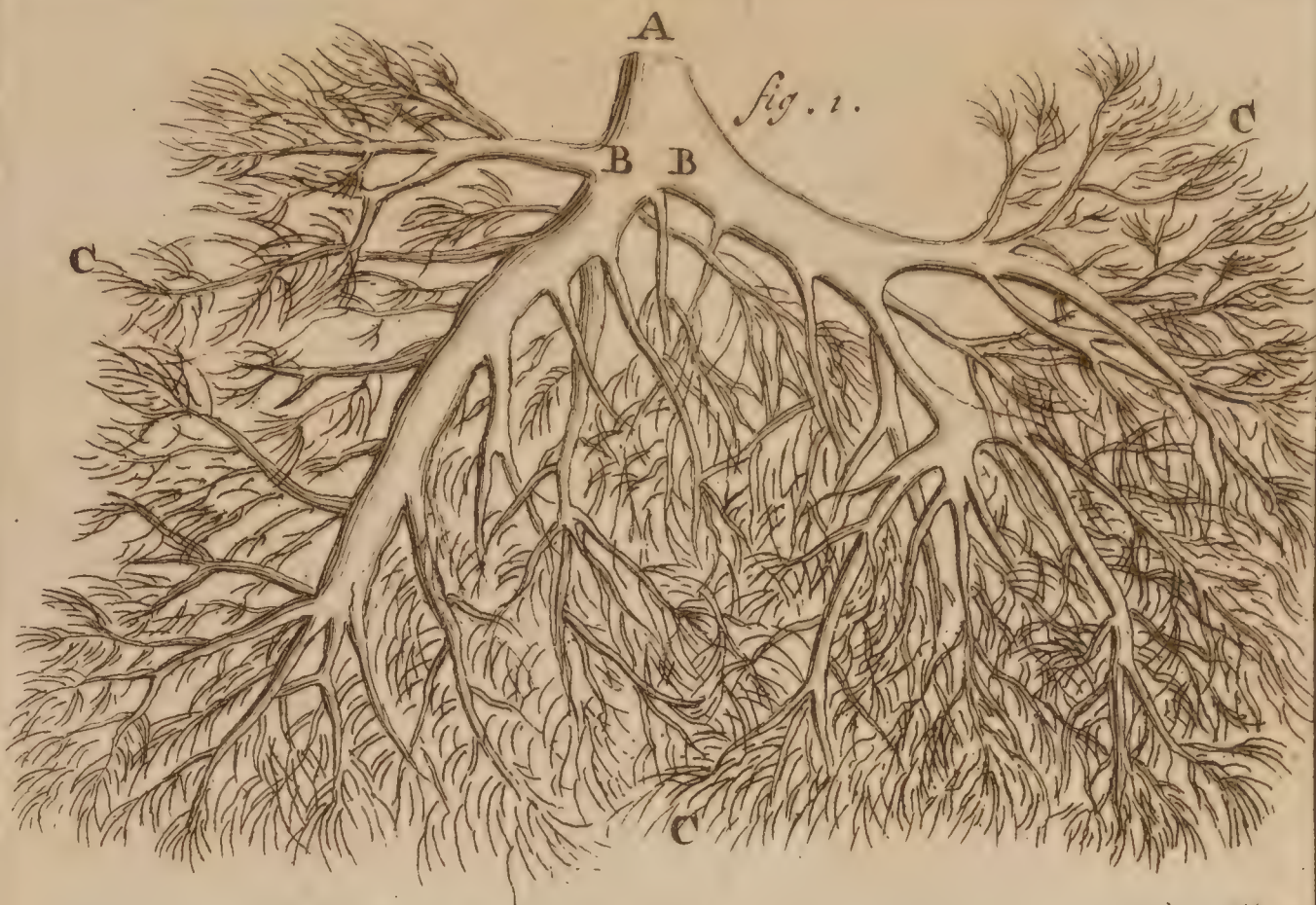
A, The *Cartilago Scutiformis*, or *Thyroides*.

bb, The *Musculi Hiothyroides*.

CC, The *Sterno Hioides*.

dd, The small Muscles call'd *Cricothyroides*.

T A B.



TAB. VII.

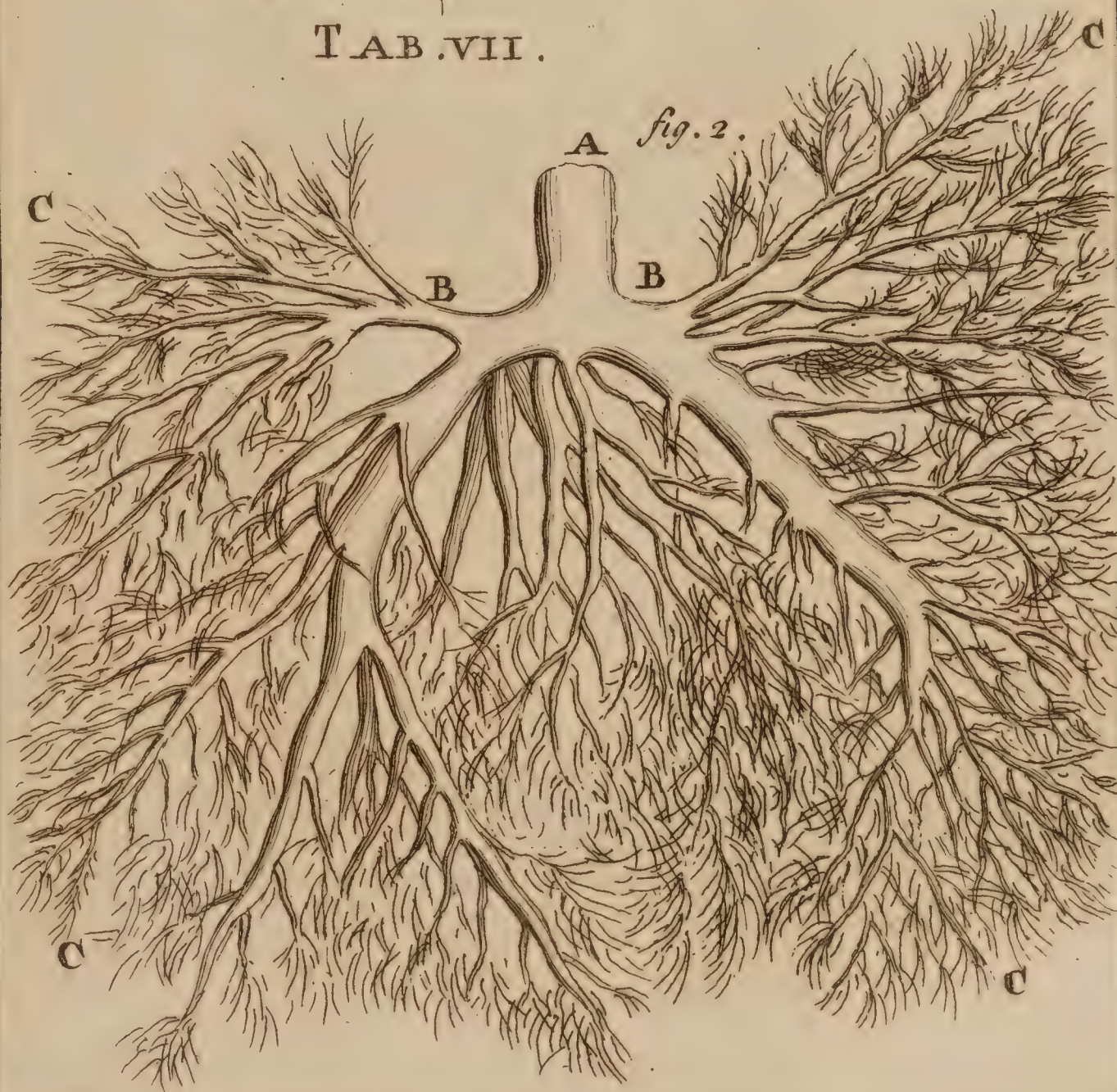


fig. 2.

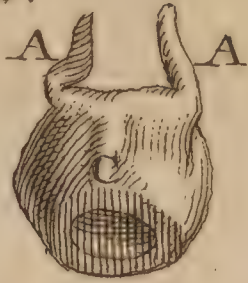


fig. 1.

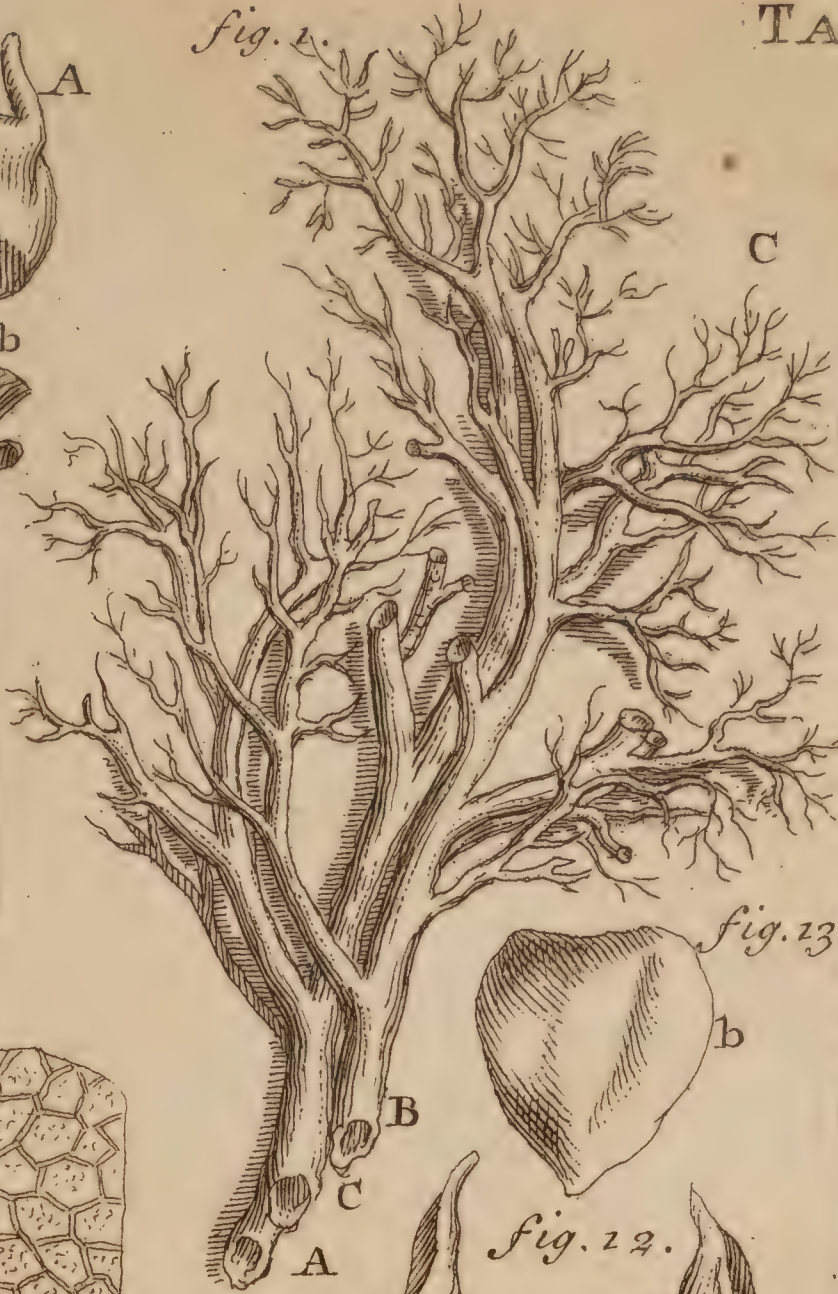


fig. 15.

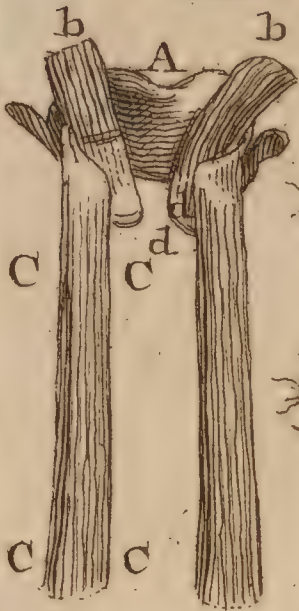


fig. 8.

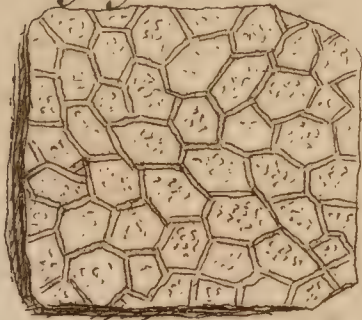


fig. 22.

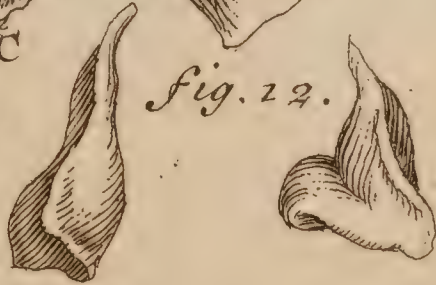


fig. 13.



fig. 10.



fig. 9.

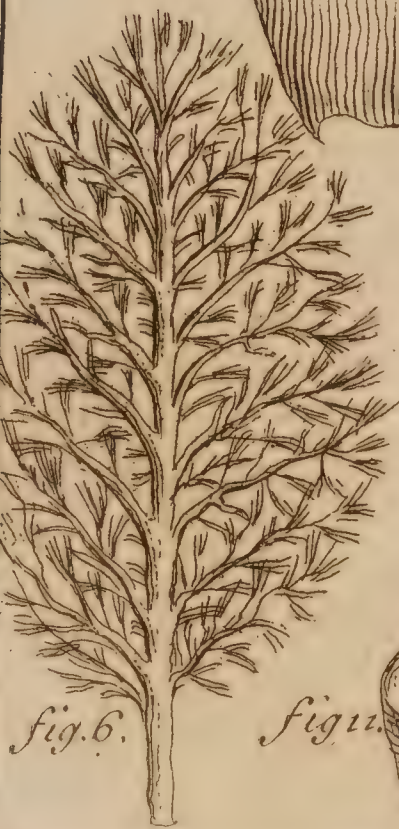
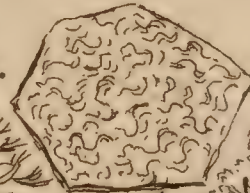


fig. 11.



fig. 5.

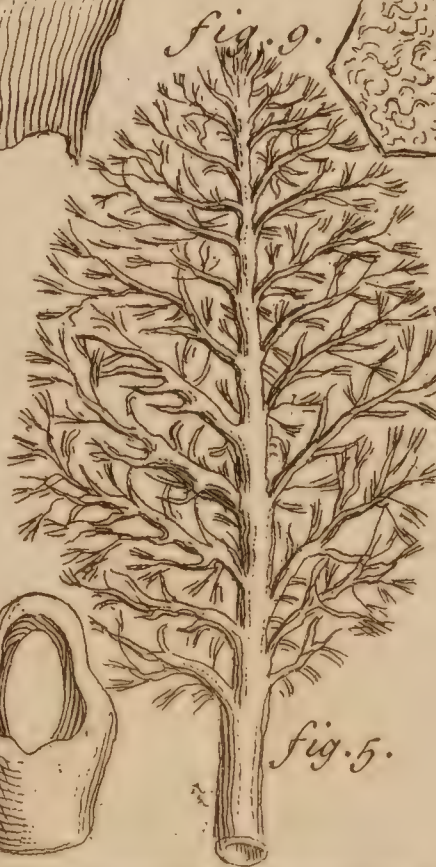


fig. 4.



T A B. IX.

From Dr. Willis.

FIG. I.

THE Lobe of the Lungs of a Quadruped (it differing very much in Figure from the Humane) in whose Surface the Lympheducts are here express'd, tho' I think a little too hard.

A, The Orifice of the *Trachea*, as it appears when divided, it being placed between the two Blood Vessels.

B, The Orifice of the Subjacent Pneumonick Artery.

C, The Orifice of the Vein of the Lungs placed above.

ddd, The external Lympheducts, dispers'd on the Surface of this Lobe.

eee, Divers of those Lympheducts, meeting on the Back of this Lobe, from whence they pass into the *Ductus Thoracicus*.

FIG. II.

Shews one Lobe of the Lungs of a Sheep divided through the middle, and the upper part remov'd (in which is the Trunk of the Vein) and the Trunk of the Wind-pipe, freed and laid by; The Ramifications of the Artery of the Lungs, are here represented in all its distributions into the little, or lesser Lobes, being first fill'd with a Tinctur'd Liquid.

AA, The lower half of the Lobe of the Lungs divided, in which the branchings of the Artery of the Lungs appear.

BB, The Trunk of the Pneumonick Artery of this Lobe.

C, The Hole after a considerable branch of it is cut off.

DDD, Its Trunks, whence other branches are cut off, which could not be express'd in this Figure; they passing to the upper part of the Lobe which is here cut off.

EE, The Trunk of the pulmonick Artery, passing according to the Length of the Lobe, and emitting branches on both sides, which pass to the right and left.

FFF, The Branches and lesser Shoots, which with the Veins every where accompany the *Bronchi*; and at length pass beyond the *Bronchi*, and encompass the Orbicular Vesicles of Air, which they with their numerous extremities twine about.

GGGG, The Bronchial Branches cut from the Trunk of the *Trachea*, and remaining in the Lungs, where they are accompanied with the Blood Vessels.

HHH, The Trunk of the *Astpera Arteria* of this Lobe of the Lungs, on which the Pulmonick Artery lay, here freed from thence and laid aside.

III, The

III, The *Arteria Bronchialis* of *Ruysch*.

N. B. That FF, &c. plac'd by the *Bronchi* of this last describ'd Figure ought to be fff, according to Dr. *Willis*, shewing the

Trunks of Branches of the *Bronchi*, which are partly those represented cut off at GGG, and partly those that pass to the other part of the Lobe.

T A B. X.

FIG. II. From *Fredrick Ruysch*, the other from Dr. *Willis*.

FIG. I.

SHews the Lobe of the Lungs, according to the Ramifications of the Wind-pipe, divided into little and lesser Lobes, whose Vessels with their Branches were first fill'd with a Liquid, before the lesser Lobes were separated from each other.

A, The Trunk of the *Aspera Arteria* cut off.

BBB, Its lower part open'd to shew the *Foramina* that lead into the several Branches, as well as its streight Fibres.

aaa, The *Foramina* which lead into the Branches.

bbb, The streight Fibres, lying on the others, which are Circular.

CC, The upper part of the Trunk of the *Trachea* remaining intire, so that the Annular Cartilages appear.

DDD, The branches of the *Trachea* constituting the lesser Lobes; also intire, so that the Annular Cartilages appear.

EE, Two of the branches slit open, to shew their *Foramina* and streight Fibres.

FF, &c. The Trunks cut off, and their Branches remov'd to make room for the expansion of those that remain.

GGG, The Secondary little Lobes of the *Bronchi*, hanging by stalks, like *Grapes*, which may still be divided into lesser *Lobuli*; all which have Ducts from the *Bronchi*, that pass into their Vesicular Cells.

H, The Blood Vessels creeping on the Superficies of the *Lobuli*.

FIG. II.

The back-part of the Wind-pipe, with its branches, freed from the Lungs of a *Calf*.

A, The *Aspera Arteria*, cut off below the *Larynx*.

B, Its branches of the right side of the Lungs.

c, Those of the left. —

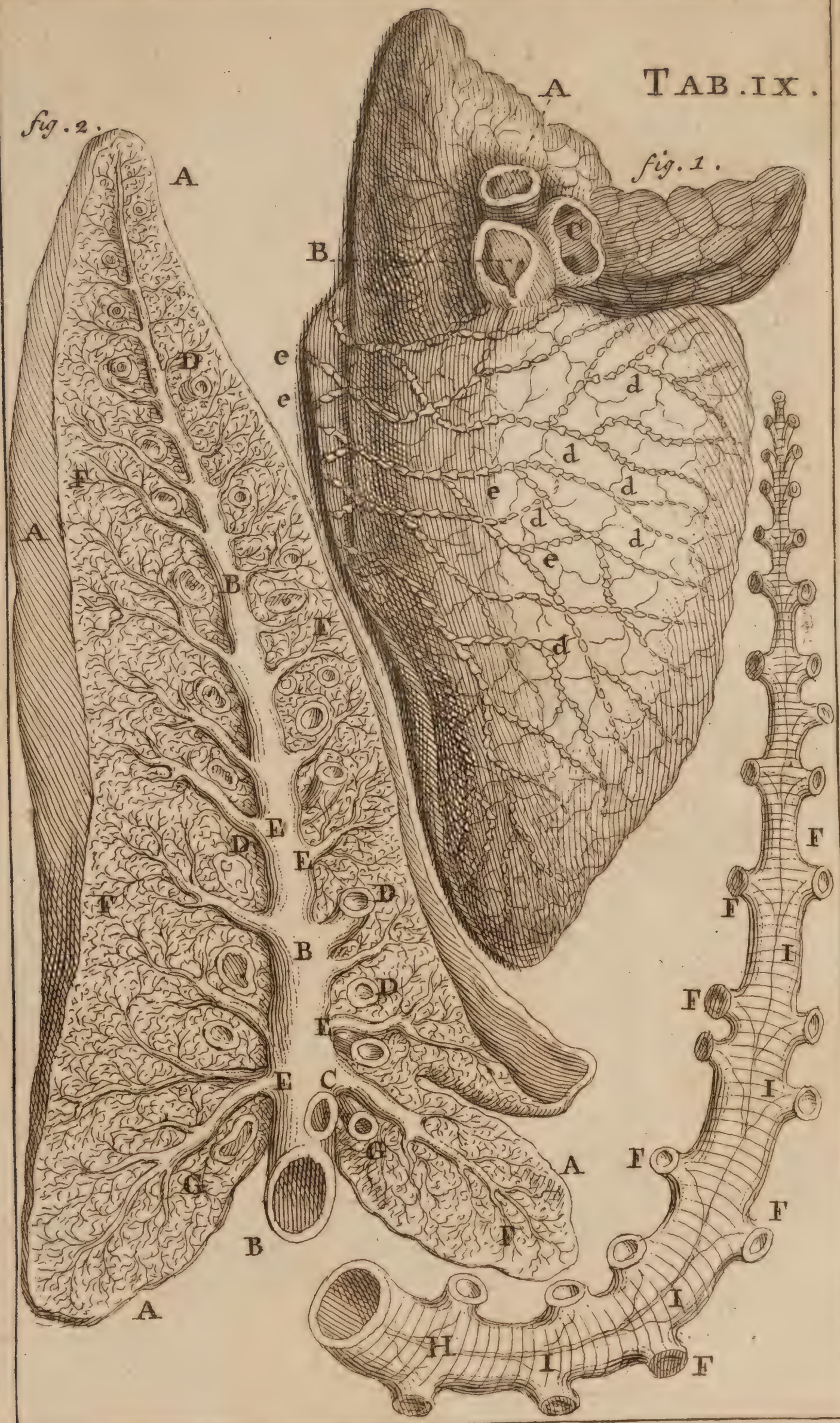
D, The *Bronchial Artery*, whose Branches accompany those of the Wind-pipe to their extremities.

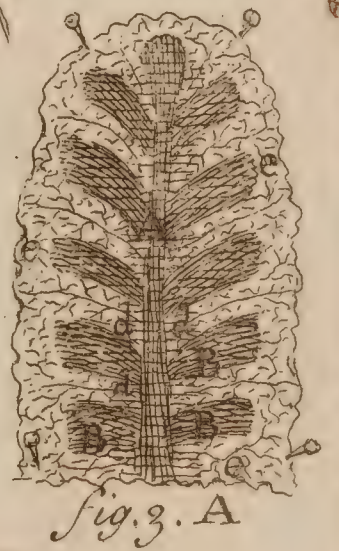
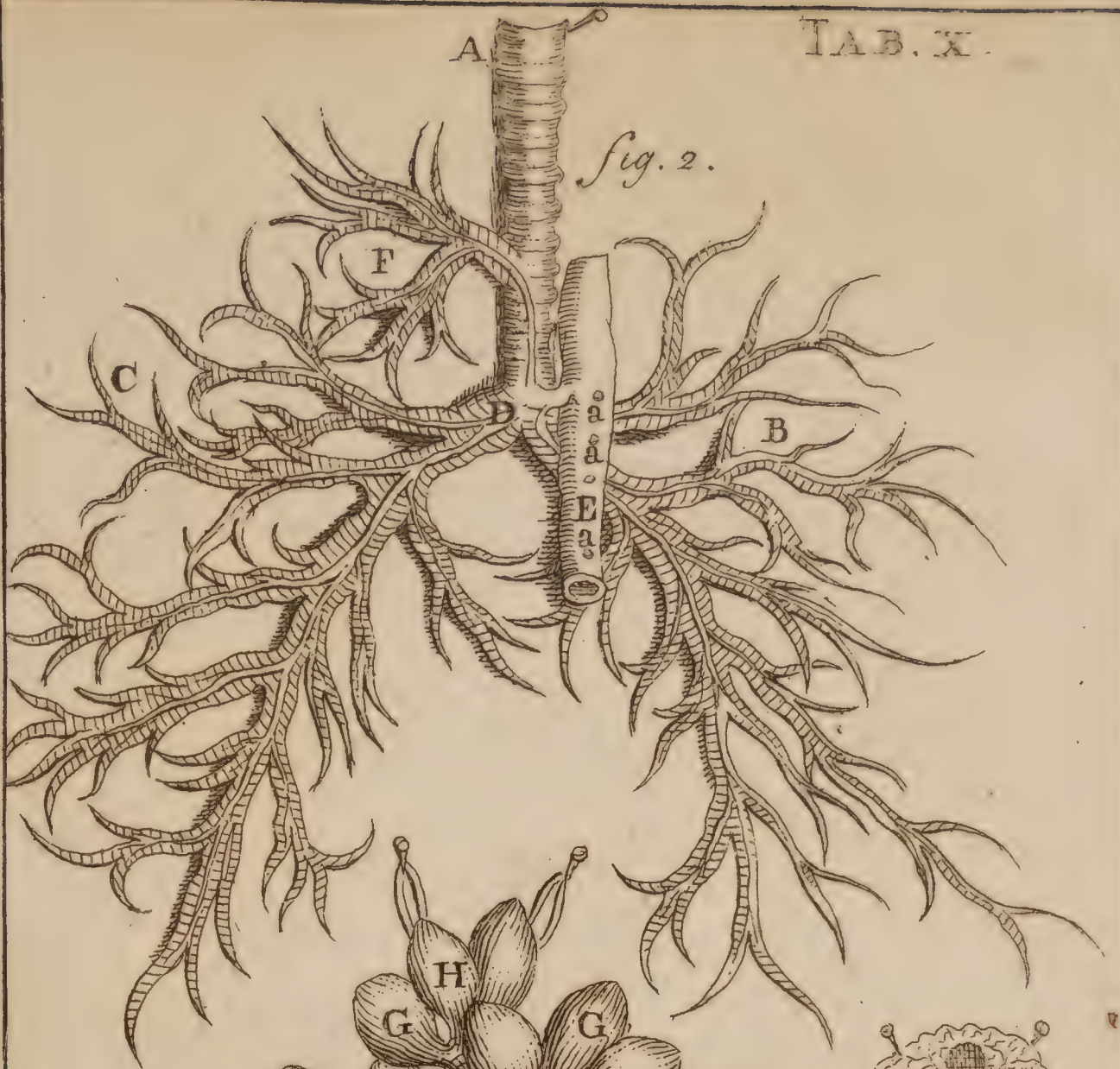
E, The hinder-part of the descending Trunk of the great Artery, where the intercostal Arteries arise from it.

aa, The

fig. 2.

fig. 1.





aa, The small Trunks of the Intercostals cut off.

F, The upper Branches of the Wind-pipe, which is peculiar to some Quadrupeds, and not found in humane Bodies.

FIG. III.

Part of the Pulmonary Lobe, in which, the Membranous *Interstitia* are blown up, and all the little Lobes appear in their proper Figure; which does

somewhat represent the Leaf of *Polypody*.

A, Part of the Wind-pipe, complicated with other Vessels that come to that stalk, and compose little Lobes that grow like the leaves of a Tree.

BB, The Lobes.

cc, The Blood-vessel creeping through them.

ee, The Membranous Interstices of the Lobes, which have also Blood-vessels in them.

T A B. XI.

FIG. I. From Vesalius, the II. from Dr. Willis, the III. from Bidloo.

FIG. I.

Shews the Brain, after the top of the Skull is taken off, and the *Dura Mater* divided and left hanging down.

AAA, The right side of the Brain, partly seen covered with the *Pia Mater*.

BB, The third *Sinus* of the *Dura Mater*, call'd *Longitudinalis*, open'd.

CCC, The Trunks of the Veins, which arise from the Brain, and empty themselves into the last mentioned *Sinus*.

DDD, The turnings and windings on the Surface of the Brain, cover'd with the *Pia Mater*.

EE, The *Dura Mater* hanging down.

FIG. II.

The Brain lying on its Hemispheres, to shew its *Basis*.

AAAA, The two foremost, and two hindmost Lobes of the Brain.

BB, The *Cerebellum*.

CC, The *Medulla Oblongata*.

DD, The Olfactory Nerves, or first pair.

EE, The Optick, or second pair.

FF, The *Oculorum Motorii*, or third pair.

GG, The Pathetick Nerves, or fourth pair.

HH, The fifth pair of Nerves.

II, The sixth.

KK, The Auditory Nerves with their two processes, viz. the hard and soft, counted the seventh pair.

LL, The eight pair, call'd *Vagus* consisting of divers Fibres.

MM, The Spinal Nerves, call'd *Accessorii*, which pass out of

of the Skull with the *Par Vagum*.

NN, The ninth pair of Nerves composed of divers filaments, which passing down, unite into one Trunk, and marches out a little above the *Processus Occipitalis*.

OO, The tenth pair of Nerves tending downwards.

PP, The Trunks of the Carotid Arteries cut off.

QQ, Their Branches marching between the Lobes of the Brain.

R, The foremost branches of the Carotide Arteries, marching between the Anterior Lobes of the Brain.

S, The hindmost branches of the Carotids, joining to the Vertebral Arteries with One Trunk.

TTT, The three Trunks of the Vertebral Arteries, descending towards the *Medulla Oblongata*.

U, Their conjunction into one Trunk.

WW, The Communicant Branches, between the Carotids and Vertebrals, from whence small Arteries ascend to the *Plexus Choroides*.

X, The *Infundibulum*.

YY, The two whitish Glands placed behind the *Infundibulum*.

ZZZ, The *Protuberantia Annularis*, by some call'd *Pons Varolij*; which arising from the *Cerebellum* admits the *Medulla Oblongata* to pass under it, as under a Bridge.

F I G. III.

The Cortical Glands of the Brain, together with the Fibres view'd with a *Microscope*.

AA, Part of the Brain boyled.

BB, The *Dura* and *Pia Mater*, which *Bidloo*, after others, has divided into three Membranes.

CC, The Blood Vessels, with their Capillary distributions and reticular *plexus*, DD.

EE, The various orders of the Cortical Glands.

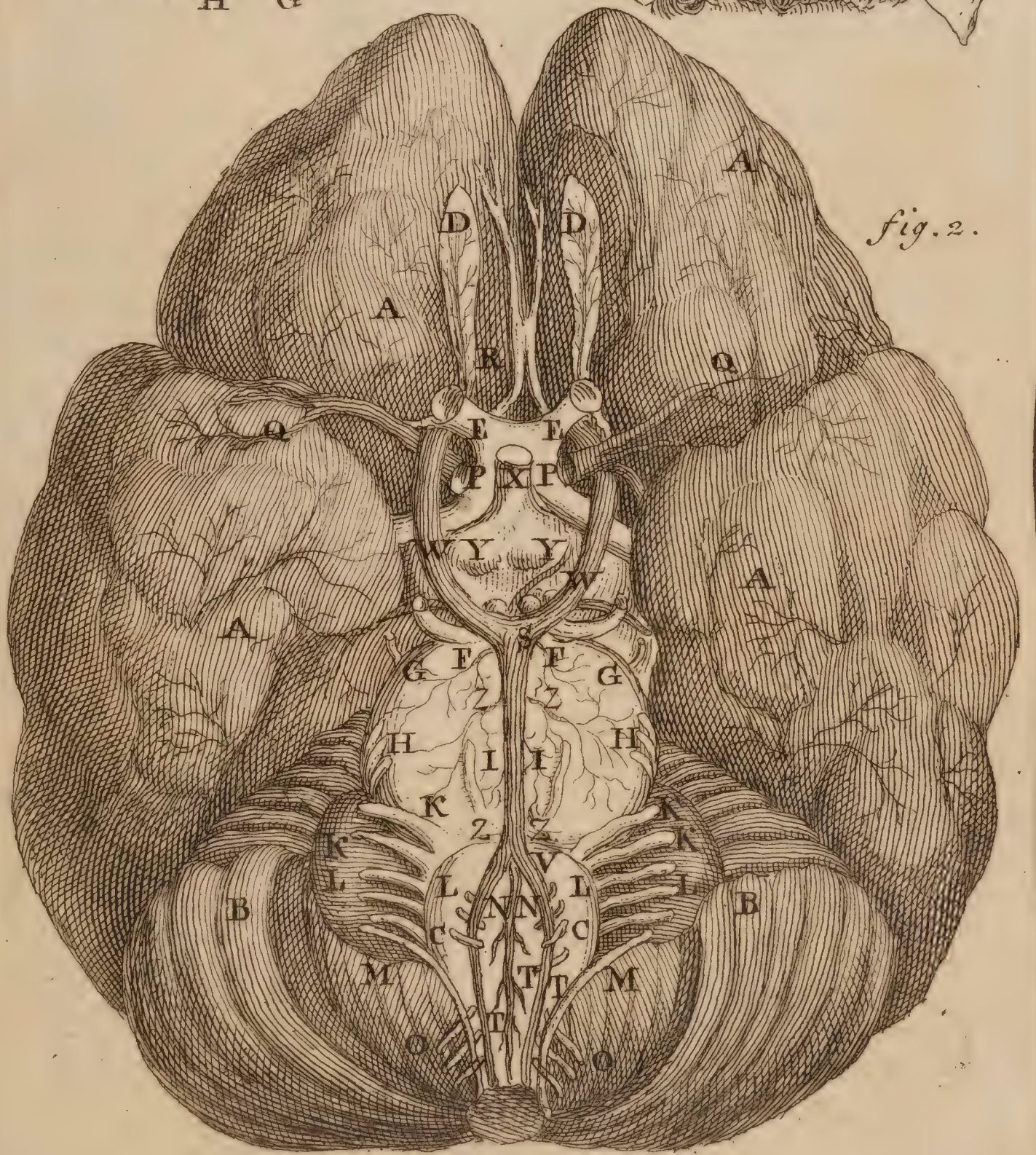
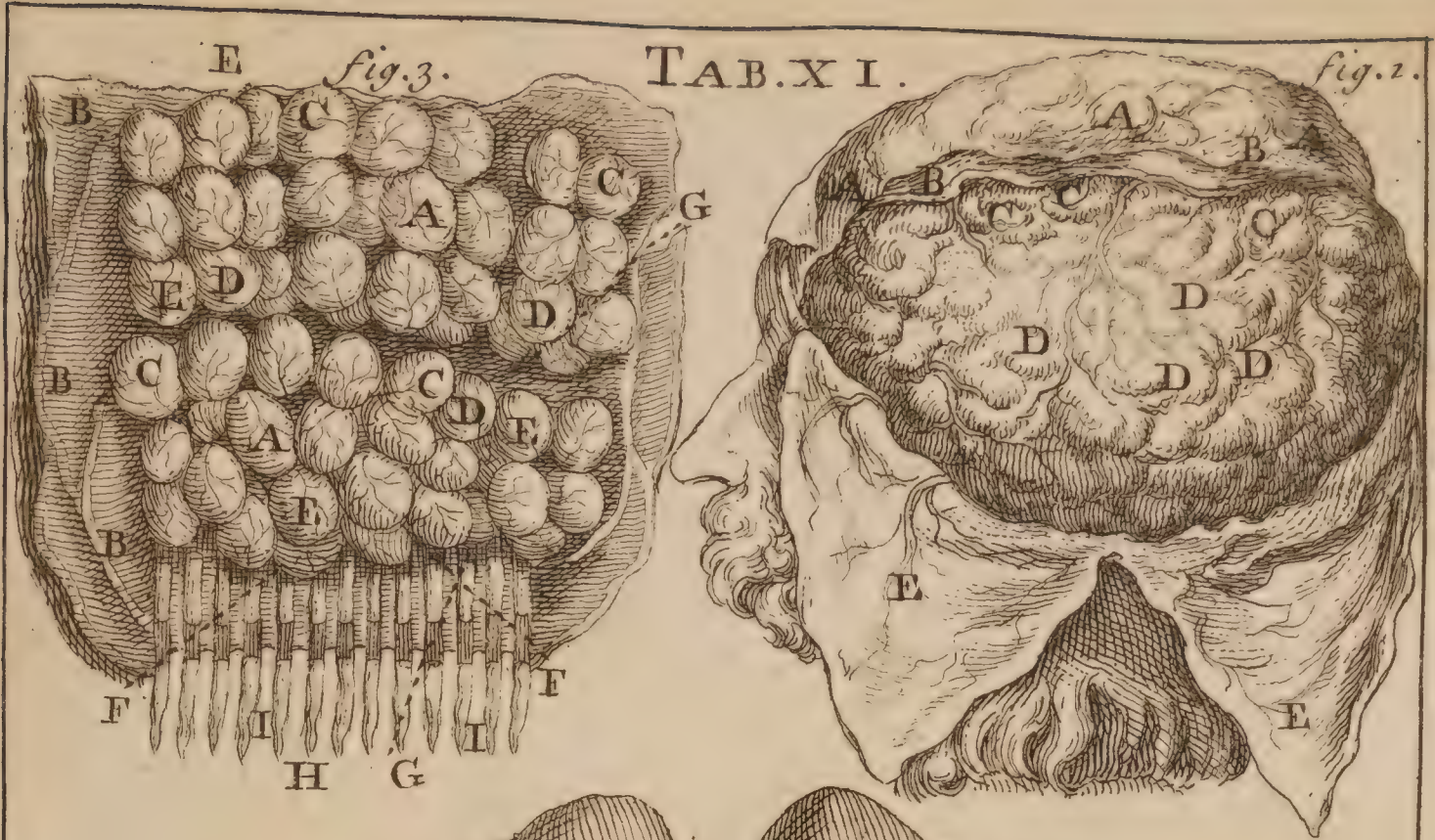
FF, The Bundles of Tubes, going together, constituting the *Medulla*.

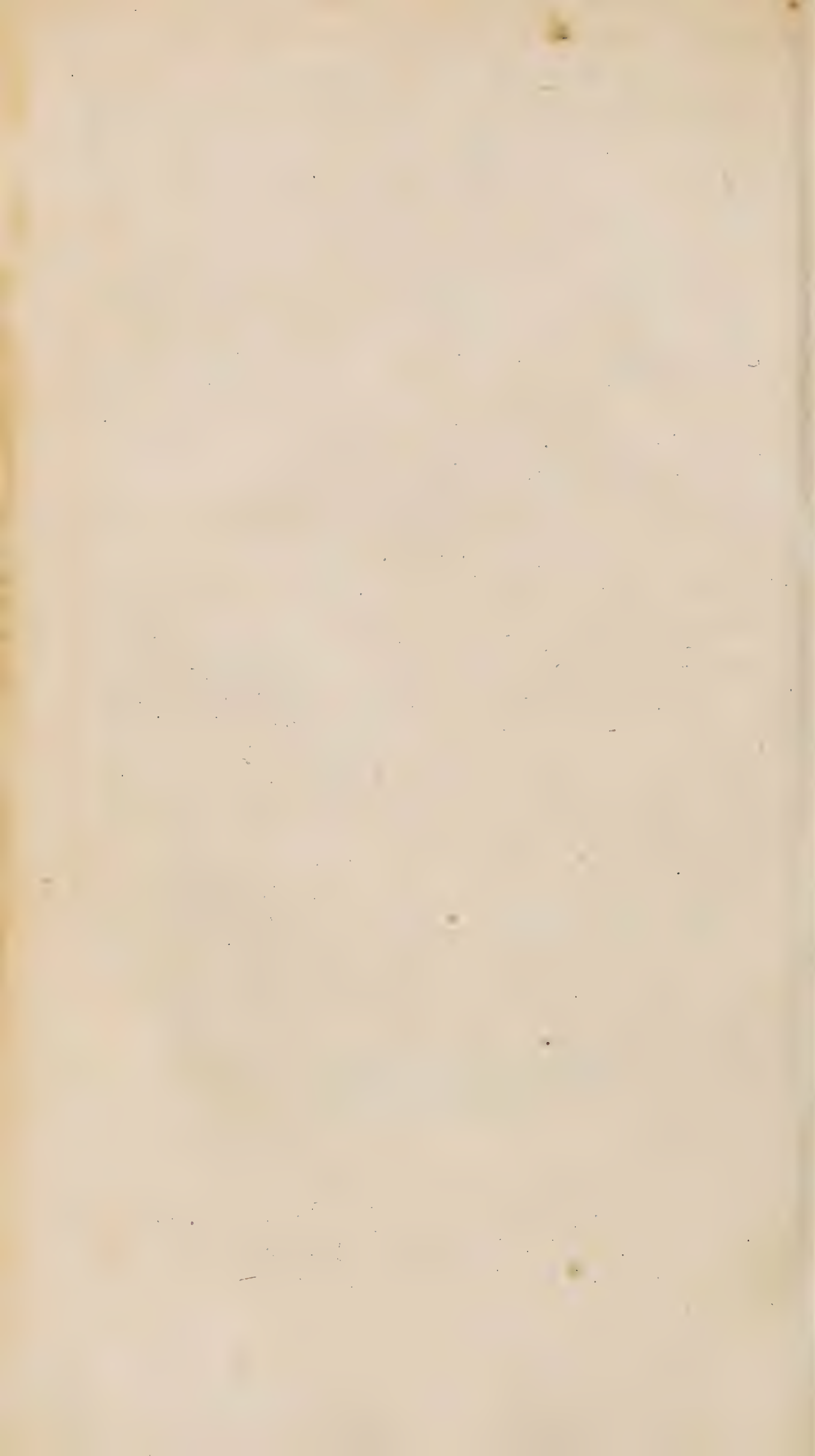
GG, The Lobes of the Bundles, or the Separations and Branches, which are writhed in divers Angles, and turned in, and variously dispos'd.

H, The complicated Tubes produced from these.

I, The Nerves, which compose the Medullary Substance.

Thus *Blanchard* and *Bidloo*.





T A B. XII.

From Dr. Willis.

F I G. I.

Shews the external or superior *Superficies* of the Brain, taken out of the Skull; the hinder Lobes (being freed from their Adhesions by the *Pia Mater* to the neighbouring Parts) are here raised and turned forwards, to shew the *Crura Medullæ Oblongatæ*, the *Fornix*, the *Nates*, and *Testes*, With the *Glandula Pinealis*, and other Processes.

AA, The *Limbus* of the Brain, which in its natural Situation, was contiguous to the *Cerebellum*.

B, The Brim or Margin of the *Corpus Callosum* of both Hemispheres, which in its natural Site, was placed on the Pineal Gland.

C, The *Fornix*.

DD, Its Arms embracing the *Crura* of the *Medulla Oblongata*.

EE, The *Thalami Nervorum Opticorum*, on the *Crura* of the *Medulla Oblongata*, whence the Optick Nerves proceed; at the tops of which *Crura* (situated further out of sight) are plac'd the *Corpora Striata*.

F, The *Glandula Pinealis*, between which, and the root of the *Fornix*, is the *Rima ad Infundibulum*.

GG, The Orbicular Protuberances call'd *Nates*.

HH, The lesser Protuberances, call'd *Testes*, which are *Epiphyses* of the former.

II, The *Processus Medullares*, which ascend obliquely from the *Testes* into the *Cerebellum*, and constitute part of its *Meditullium* on both sides.

K, The joining of those Processes by another Transverse Process.

LL, The Pathetick Nerves, arising from the last mention'd transverse Process.

MM, A Portion of the *Medulla Oblongata*, lying under the aforesaid Processes and Protuberances.

N, The *Foramen* of the third Ventricle or Cavity; which is placed under the Orbicular Protuberances.

OO, A Portion of the Annular Protuberance (call'd *Pons*) sent from the *Cerebellum*, and embracing the *Medulla Oblongata*.

PP, The external and superior *Superficies* of the *Cerebellum*.

F I G. II.

The interior *Basis* of the Skull, where is shewn, after what manner the Blood-Vessels and Nerves; when cut from the Brain and about to go out of the Skull, are cover'd by the *Dura Mater*.

b

A, The

A, The Bone of the Fore-head, in which (towards the top of the Nose) there's a Cavity, but not express'd in this Figure, as *Blancard* pretends.

B, The *Septum* of the *Os Cribriforme*, call'd *Crista Galli*.

CC, The Mammillary Processes, which are much less, and have less Cavities in them, than is found in these parts in Quadrupeds, which are indued with a more exquisite Sense of Smelling.

DD, The Optick Nerves, which in human Bodies part farther from each other, before they pass out of the Skull, than in most Quadrupeds.

E, The Pituitary Gland, with the top of the *Infundibulum* inserted into it.

EE, The Carotid Arteries coming in, by the sides of that Gland.

g, The *Infundibulum*.

hh, The third pair of Nerves, call'd *Oculorum Motorii*, going out of the Skull.

HH, The Pathetick Nerves, hid under the *Dura Mater*, and going out of the Skull with the former; these are reckon'd the fourth Pair.

II, The fifth Pair of Nerves, hid under the *Dura Mater*.

KK, The sixth Pair of Nerves, having a very long Progress under the *Dura Mater*, before they pass out of the Skull, with the third and fourth Pair.

LL, The seventh or Auditory Pair, entring the *Os Petrosum* with double Processes.

MM, The eighth Pair, call'd *Vagus*, compos'd of many Fibres, which join with the Accessory Nerve, NN, as they march out of the Skull.

OO, The ninth Pair.

PP, The tenth Pair, tending downwards, and passing under the *Dura Mater*, where the Vertebral Arteries ascend.

QQ, The Lateral Sinusses open'd.

T A B. XIII.

FIG. I. From Dr. Willis, the other from Bidloo.

FIG. I.

A Sheep's Brain, divided through its middle, and its Hemispheres turn'd over; some parts of it being scrap'd away, to shew its Medullary Tracts, or Nervous Roots.

AA, The Medullary Protuberances, call'd *Testes*, which are

Epiphyses of the *Medulla Oblongata*, and join'd to the *Caudex Medullaris* of the *Cerebellum*, looking from thence towards the Brain.

BB, The *Protuberantiae Nativae*, the Substance of which, in Sheep, Goats, and many other Creatures, is partly Cortical, and partly Medullary; but in a Man,

fig. 1.

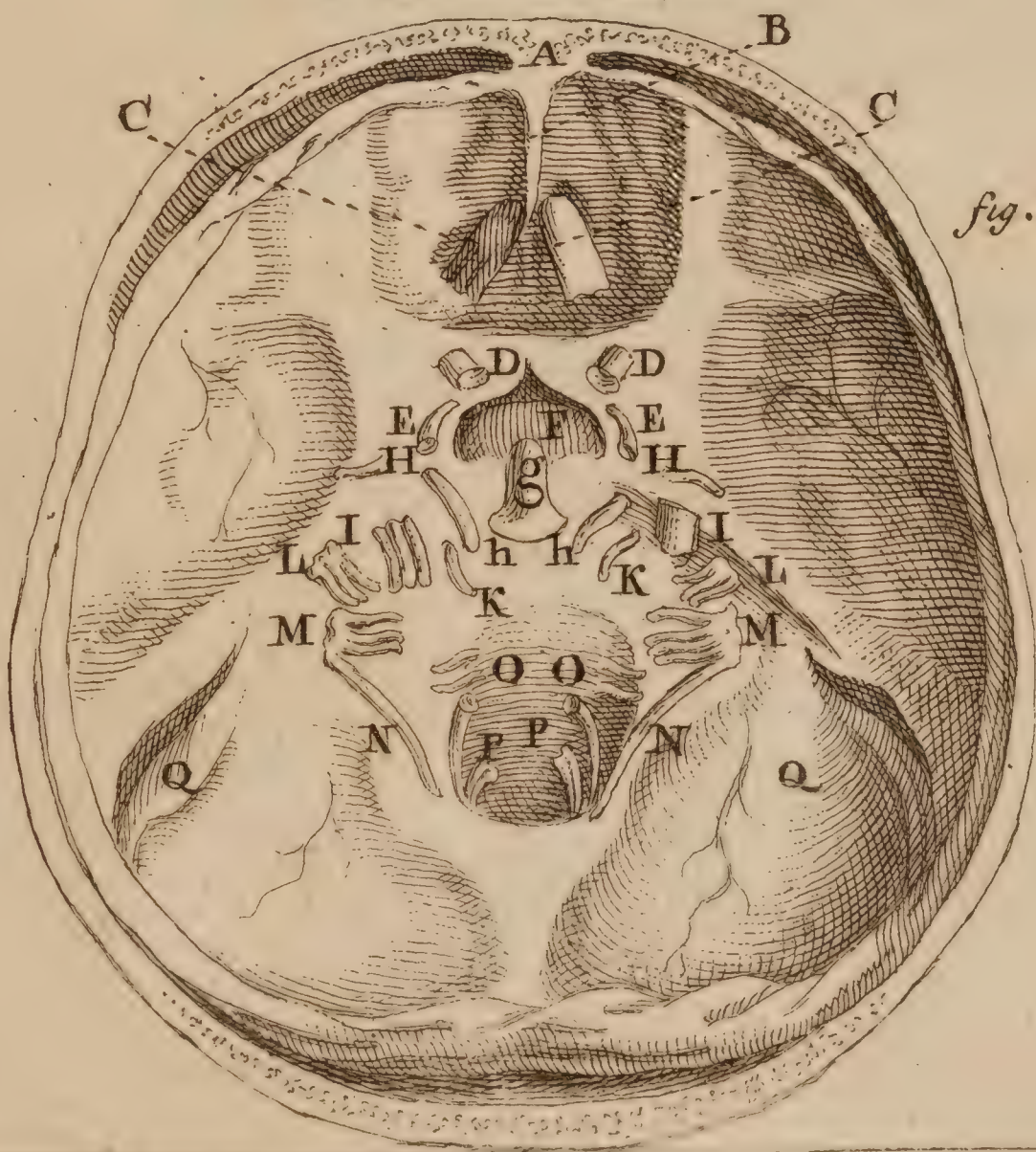
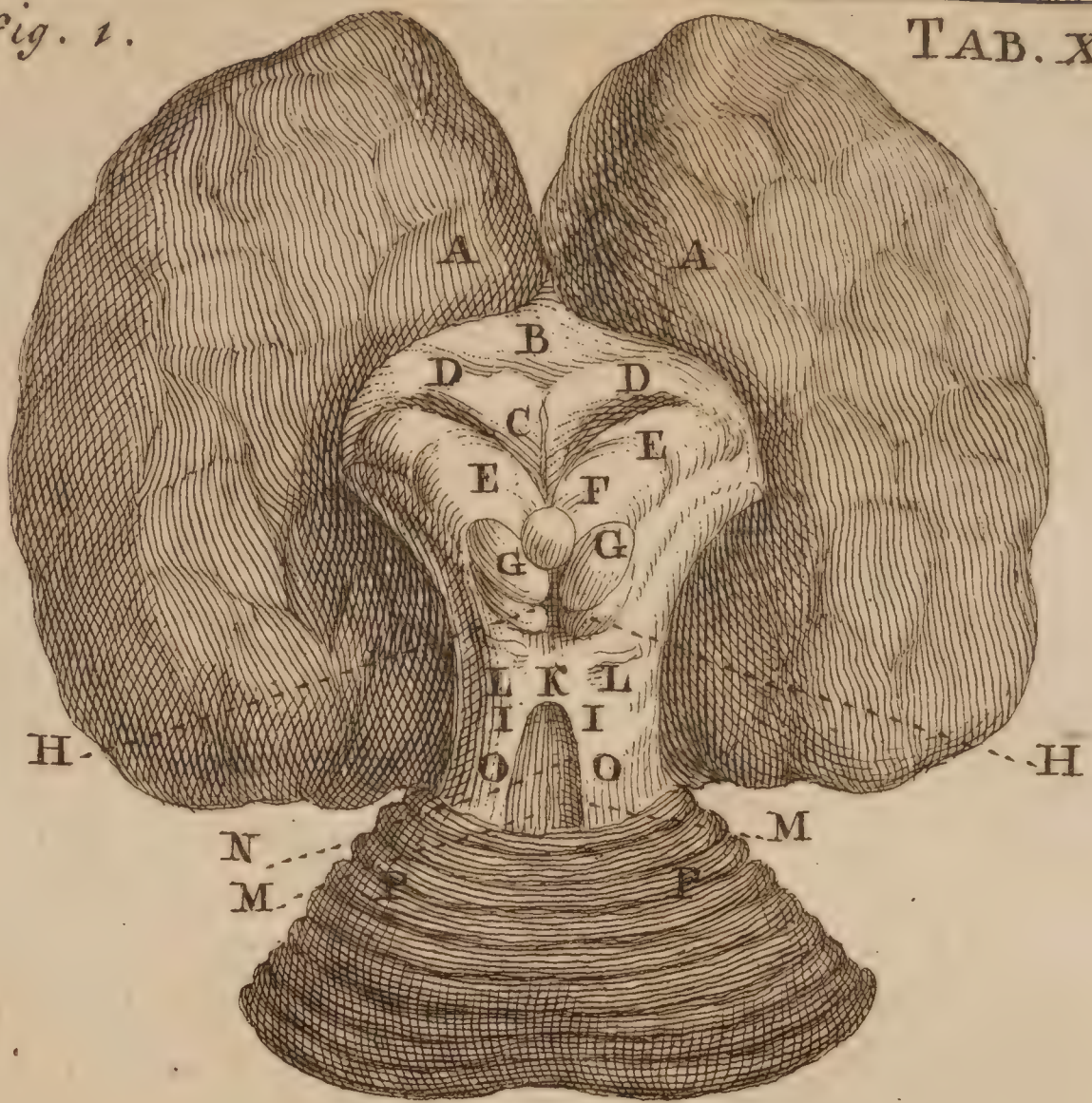


fig. 2.

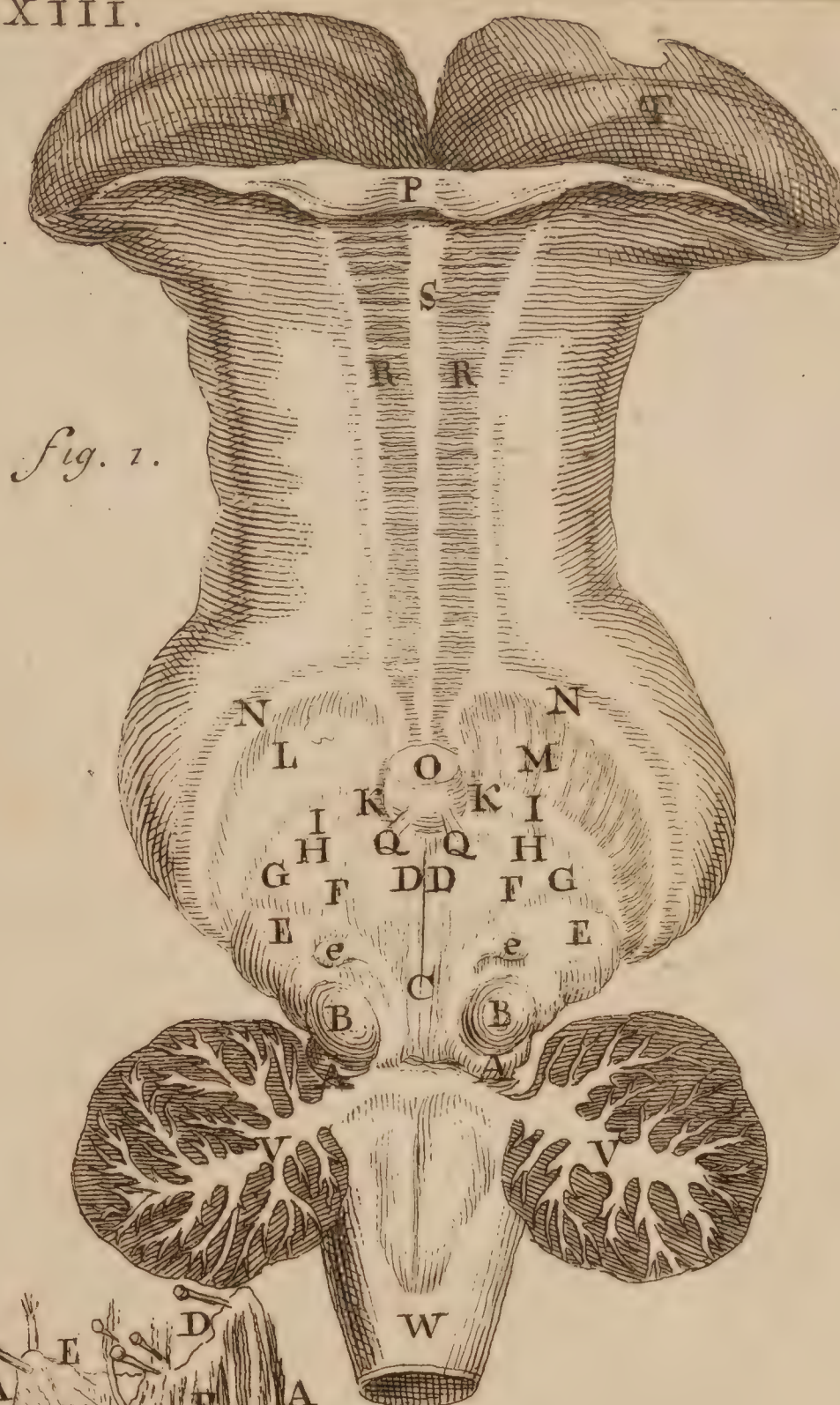


Fig. 2.

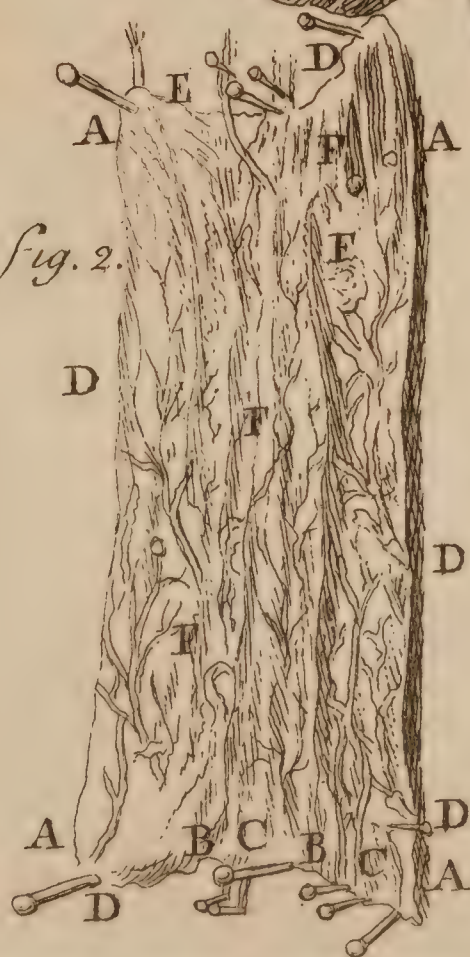


Fig. 2.

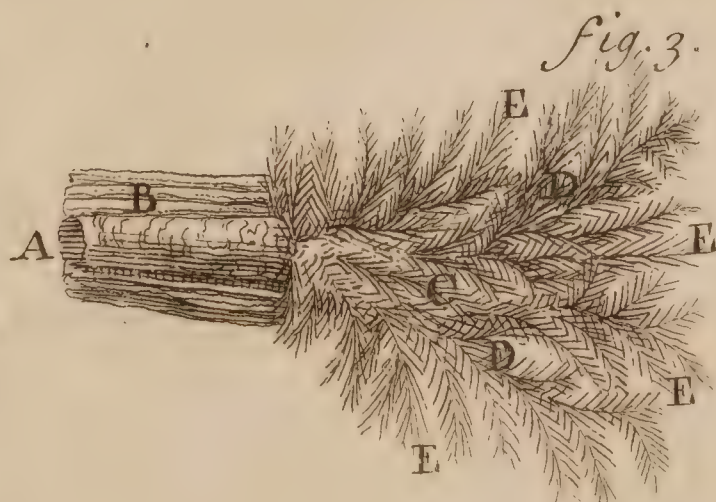


Fig. 3.



Man, Dogs, Foxes and others, it is wholly Medullary.

C, The Cavity, or third Ventricle, under the Prominences which are here dissected and open'd.

DD, The two Medullary Cords of the *Caudex Medullaris*, passing strait to the *Corpora Striata*.

EE, The *Thalami Nervorum Opticorum*.

ee, The *Glandula Pinealis*, divided and laid apart.

FF, The Nervous or Medullary *Ductus*, proceeding from the Prominences, which is presently divided; one Branch G, passing to the Cone of the *Corpora Striata*, the other H, going to its *Basis*.

I, A *Surculus* from the Medullary Branch, passing at the *Basis* of the *Corpus Striatum*, and reaching to the middle of its *Limbus*.

K, The posterior *Limbus* of the *Corpus Striatum*, receiving Nervous Ducts, which are united under the Roots of the *Fornix*, with the same *Limbus* of the other side.

L, The *Corpus Striatum* of the left side whole, with the Blood-Vessels creeping on its cortical Surface.

M The *Corpus Striatum* of the right side; the cortical Surface of which is cut off to shew its Medullary *Striae*.

NN, The foremost *Limbus* of the *Corpora Striata*, joining in the *Corpus Callosum*.

O, The *Basis* of the *Fornix*.

P, The Trunk of the *Fornix*, cut off and turn'd back with the Brain.

QQ, The two Roots of the *Fornix*.

RR. The internal Surface of the *Corpus Callosum*, mark'd with transverse medullary *Striae*.

S, A *Sepimentum* of the Medullary *Striae*.

TT, The hinder part of the Brain, which rested on the *Cerebellum*, turn'd up.

VV, The *Cerebellum* divided and laid apart.

W, The *Medulla Oblongata* immediately below the fourth Ventricle.

FIG. II.

The *Plexus Choroides*, view'd by a Microscope.

AA, The Membranous Covering separated, which incloses the *Fasciculi* of Vessels.

B, The Arteries, and

C, The Veins (whose Ramifications and *Plexus* are made to appear) being fill'd with *Plaster of Paris*, and their own Blood.

D, The Lymphæducts somewhat distended with Wind.

E, The *Fibrille* of the Nerves,

F, The Glands placed between the Nerves, some of which are hard and fibrous, others are Vesiculous and more Flaccid.

FIG. III.

The Structure of a Nerve, express'd by the assistance of a Microscope.

A, The Branch of a Nerve dissected from the Neck.

B, The Blood-Vessels.

C, The *Fasciculi* of Tubes separated.

D, The Tubes cleaving by lateral Fibres.

E, The Villous Extremities of the Tubes.

T A B. XIV.

From Dr. Willis.

FIG. I.

SHews the *Basis* of a Sheep's Brain, some parts being pared away, and others exposed bare, so that the *Striæ*, or Medullary Tracts, appear like so many Nerves.

AA, The Mammillary Processes carried to the *Basis* of the *Corpora Striata*, and inserted into them.

BB, The part of the Brain remaining after the greatest part of it is cut off.

CC, The *Corpora Striata* deraised, so that the *Striæ Medullares* of its internal part appear.

DD, The *Thalami Nervorum Opticorum*, in which the Medullary *Striæ* pass streight, and very close towards the *Corpora Striata*.

E, A Tract leading to the *Infundibulum*.

F, A Gland placed behind the *Infundibulum*, which is double in Man.

GG, The Trunks of the Optick Nerves, divided at their *Joining* or *Coalition*, before the *Infundibulum*, and turn'd off.

HH, The *Crura* of the *Medulla Oblongata*, under the *Nates* and *Testes*, in which the *Striæ Medullares* pass streight, and very thick and close together towards the *Corpora Striata*.

II. The Transverse Medullary Tracts, distinguishing the

Regions of the *Medulla Oblongata*.

KK, The Annulary Process passing about the *Medulla Oblongata*, nigh the *Cerebellum*.

L, The Extremity of the *Medulla Oblongata*, near the beginning of the Spinal-Marrow, M.

FIG. II.

The Orbicular Prominences (*i. e.* the *Nates* and *Testes*) and *Thalami Nervorum Opticorum*, pared off on one side, to shew their internal Compages.

AA, The *Testes* which have streight Fibres through the whole.

B, One of the *Nates* deraised, in which the Medullary Fibres pass streight and thick towards the Brain.

C, A Medullary *Septum*, dividing the Natiform Prominences from the Optick *Thalamus*; from which one Medullary Process passes to the *Basis* of the *Corpus Striatum*, the other into its *Cone*.

D, The *Thalamus* of the Optick Nerve of the left side deraised, to shew its streight and very close Fibres passing towards the *Corpus Striatum*.

E, The posterior *Limbus* of the *Corpus Striatum*, receiving the Optick Medullary *Striæ*, and those of other Medullary Processes.

F, The

fig. 1.

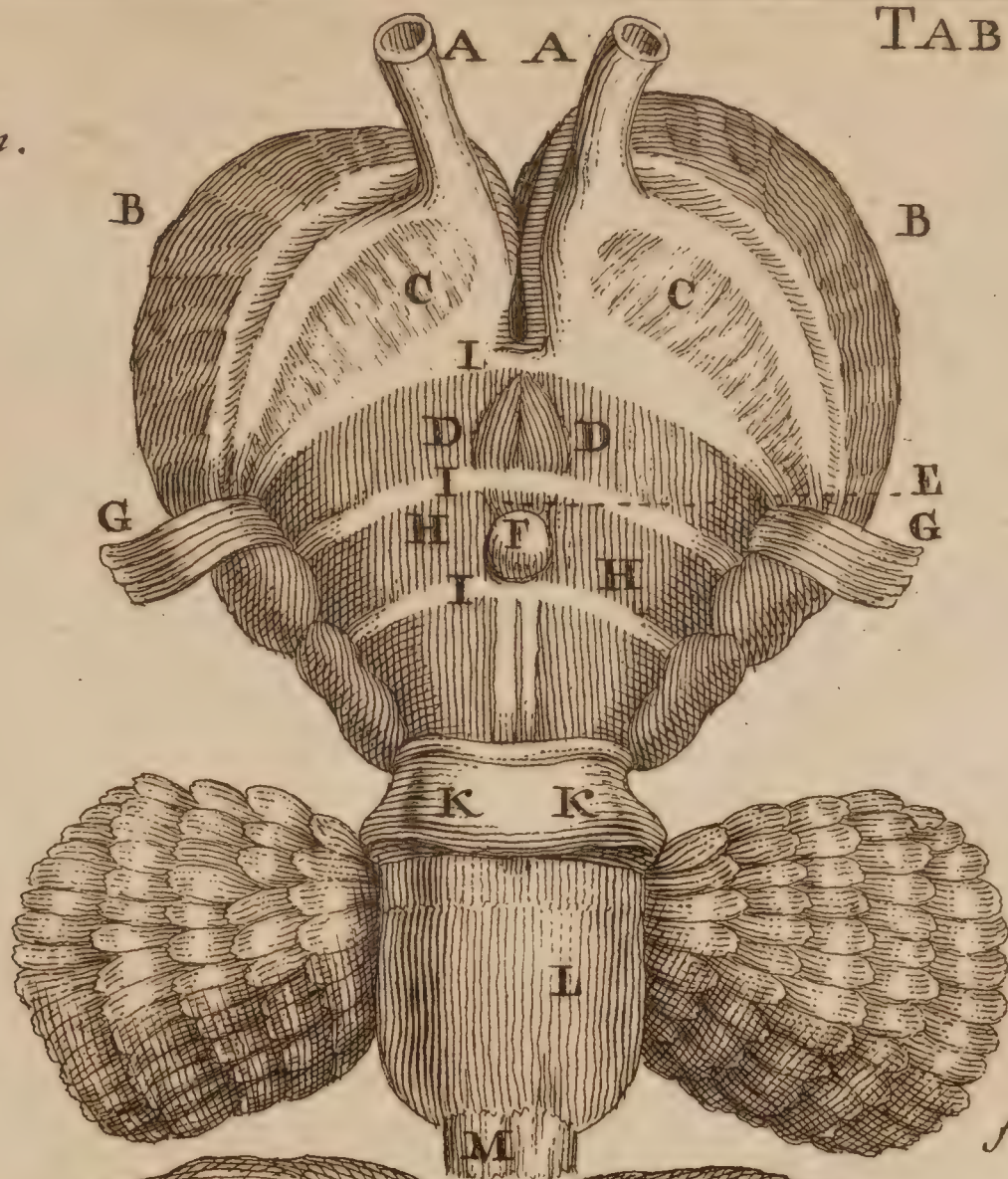
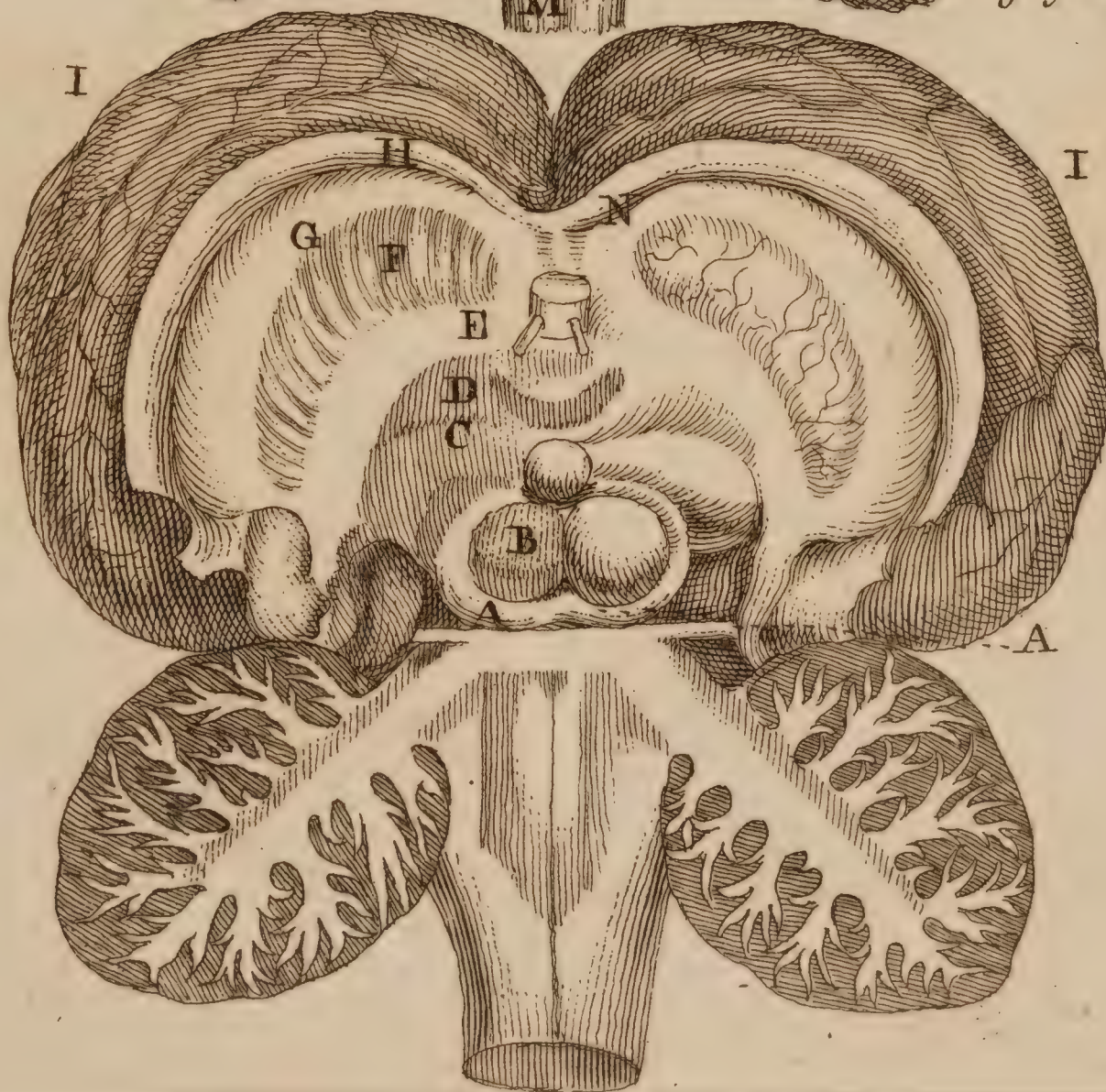


fig. 2.





F, The *Corpus Striatum* erased, whose Nerves and Medullary Ducts are in like manner express'd Tab. XIII. Fig. I. M.

G, The *Anterior Limbus* of the *Corpus Striatum*.

H, A *Sinus* from the Mamil-

lary Process, leading into the anterior Ventricle of the Brain.

I, The Hemispheres of the Brain.

The rest of the Characters are explain'd in the preceding Figure.

T A B. XV.

FIG. I. & III. from Gerard Blasius, the rest from Dr. Willis.

F I G. I.

PArt of the Spinal Marrow taken out of the *Vertebra* of a Dog express'd as big as the Life.

aa, The nervous Filaments arising from the back-part of the Spinal Marrow.

bb, Those of the fore-part.

cccc, The *Dura Meninx* divided, according to its length, on the back-part of the Spinal Marrow next the Spines of the *Vertebra*, and laid aside.

d, The Union of the Nervous Filaments a, b, after they have pass'd the *Dura Meninx*, where they make a *Ganglion* at their exit, between the *Vertebra*, and compose the Trunk of the Nerve,

e, A large Fissure in the back-part;

f, A less Fissure in the fore-part of the Spinal Marrow.

g, The internal Cortical Substance, of a Cineritious Colour.

F I G. II.

Shews the whole Spinal Marrow taken out of the Bony *Specus* of the *Vertebra*, together with its investing Membrane, which is here divided according to its length, to shew the Originals of the Nervous Filaments of all the vertebral Nerves from the *Medulla Spinalis*.

AA, The upper part of the *Medulla Spinalis*, cut from the *Oblongata*.

BB, The *Arteria Spinalis* passing the whole length of the Spinal Marrow, which communicates in the Neck with the Cervical Arteries, as express'd Fig. IV. g h &c. The lower part of this Spinal Artery having *Anastomoses* with the Vertebral Arteries arising from the *Arteria Magna*. Vid. Fig. II. of the following Table.

CC, The *Nervus Spinalis*, by Dr. Willis call'd *Accessorius*, arising about the 5th and 6th *Vertebra* of the Neck, and going

out of the Skull with the *Par Vagum*.

DD, The *Dura Mater*, or investing Membrane of the Spinal Marrow, divided according to its length, and expanded.

EE F f, The Nerves of the Neck.

Gg, The Nerves that pass to the Arms, and arise from that part of the *Medulla Spinalis* that is somewhat dilated, and have larger nervous *Fasciculi* at their *Originals*.

Hh, The Nerves of the Back, where the Spinal Marrow is lessened again.

Ii, The lower part of the Spinal Marrow, which sends Nerves to the Loins and Legs, and is intirely Fibrous in humane Bodies, but is Medullary in most Quadrupeds, and is there somewhat dilated again.

K, The Nerves passing out of the *Os Sacrum*.

F I G. III.

Part of the Spinal Marrow of a Dog cut transversly.

aa, The lesser Fissure before.

bb, The larger Fissure on the hind part.

ccc, The Nervous or Medullary *Stria*, tending from the Cineritious or Glandulous Substance to the Circumference.

ddd, The Glandulous Substance plainly distinguishable from the Nervous or Medullary.

F I G. IV.

The Ramifications of the Vertebral Arteries, both in the

upper part of the *Medulla Spinalis*, and back part of the *Medulla Oblongata*.

AA, The back part of the *Medulla Oblongata*.

B, Both the Vertebral Arteries united.

C, The Rhomboid Figure, which represents a double Coalition of the Arteries in Brutes.

D, The Meeting of the Vertebral and Cervical Arteries on the *Medulla Spinalis*, from whence the Spinal Artery descends.

E, The Spinal Artery.

FF, The two Vertebral Arteries arising from the Axillary Arteries.

G, The *Medulla Spinalis*.

ff, or, the Arteries that go to the Muscles of the Neck.

gg, The Branches sent to the Spinal Marrow, which join at both sides in the Spinal Artery, at each meeting of the *Vertebrae*.

hh, Branches of Arteries which pass into the Channels of the *Sinusses*, and make an Arterious *Plexus*.

ii, The Arteries sent from the *Aorta* into the Spine.

F I G. V.

The Ramifications of the 5th and 6th Pair of Nerves.

A, The Nerve of the sixth Pair from the Trunk, of which, the Doctor says, are sent two shoots into two of the Muscles of the Eye at aa, which are not express'd in this nor his original Figure.

Z, A Branch of the Nerve of the sixth Pair, reflected for the

the Root of the Intercostal Nerve.

B, The Trunk of the fifth Pair, immediately before it is divided in two large Branches,

bb, Two Shoots reflected from one of the Branches for the Root of the Intercostal Nerve.

C, The Division of the upper Branch into lesser Branches, of which the superior (c) is the Ophthalmick, which enters the Orbit of the Eye, and sends out four Branches; The first (O) is reflected into the Nostrils; The second (d) passing the outside of the Orbit of the Eye, runs into the Muscles of the Forehead; The third and fourth (ee) are distributed to the *Palpebrae* and internal Gland of the Eye.

D, The second Branch of the second Division also enters the Orbit, and passes towards the external Angle of the Eye, and is distributed to the *Palpebrae* and exterior Glands.

E, The third Branch of the second Division, passes by or under the Orbit of the Eye, marching through a hole in the Bone of the upper Jaw, in which passage it sends a Branch (e) by another *Foramen* into the *Musculus Masseter*.

f, A Branch running to the Muscles of the Nose.

ggg, Divers Branches descending into the upper Lip.

F, The inferior Branch, or fourth of the second Division, which descending strait towards the Roof of the Mouth, is divided into two Branches, of which one of them (h) is

distributed into the Gums; the second (i) is disseminated with many Twigs into the Palate.

G, The second Branch of the first Division of the *Par Quintum*, which passing strait downwards into the lower Jaw, in its way sends many Branches; as follows,

K, One of its Branches to the Parotid Gland;

l, Another to the internal Masticatory Muscles;

m, Another Branch passing round the Process of the lower Jaw, is carried to the external part of the *Masseter*;

n, Another *Surculus* running opposite to the former, on the same Process, and distributed into the internal part of the same Masticatory Muscle.

H, A Trunk of a great Branch passing further on, is divided into divers Branches; of which that at O tends to the Root of the Tongue; P That which goes to the whole Body of the Tongue with many Branches; q Those that pass to the parts under the Tongue; rr The Trunk that passes through the lower Jaw, and gives slips to the Teeth, and to the lower Lip sss; and partly to the Chin tt.

FIG. VI.

All the Nerves of the third, fourth, fifth and sixth Pairs, that pass to the Muscles, and other parts of the Eye.

A, The Nerve of the third Pair, which passes to three of the strait Muscles, and the external

external oblique Muscle of the Eye.

B, A Nerve of the fourth Pair, or Pathetick Nerve, passing into the *Musculus Trochlearis*.

C, A Nerve of the sixth Pair, proper to the *Musculus Abducens*, and *Septimus Brutorum*,

D, A, Nerve of the fifth Pair, whose Ophthalmick Branch (E) is divided into two; F The upper Branch is presently split into several Twigs, marching strait to the internal Angle of the Eye; G the lower Ophthalmick Branch divided into Branches, and in a like manner passes to the Gland and *Palpebre*, at the external Angle of the Eye.

a, A Nerve of the fifth Pair, passing to the *Musculus Trochlearis*:

b, A Branch of the third, to the *Attollens*:

c, Another Branch of the same, to the *Abducens*:

d, Another of the same, to the *Deprimens*:

f, Another to the *Musculus Obliquus Externus*:

g, Little Nerves from the Plexus of the third Pair, passing through the Sclerotick Tunick into the *Uvea*.

e, A Nerve of the sixth Pair, to the *Musculus Abducens*.

ooo, Fibres of little Branches from the fourth and sixth Pair, passing to the *Musculus Septimus Brutorum*.

n, A Nerve from the upper Ophthalmick Branch, going into the Nostrils (i); One from the same Branch into the Eyebrows and Forehead.

H, The Trunk of the fifth Pair cut off, which went to the lower Jaw.

I, Another Trunk of the same, which went to the Palate, also cut off.

K, The Branch of the upper Jaw.

T A B. XVI.

From Dr. Willis, but very ill copy'd, wherefore the Original Figure is here referr'd to; see the Doctor's ninth and eleventh Tables of his *Anatomy of the Brain*.

FIG. I.

SHews the beginnings of the fifth and sixth Pairs of Nerves, and the Roots of the Intercoastal Nerve proceeding from them; likewise the Origins and Branchings of the

same intercoastal Nerve, and the *Par Vagum*, and the Accessory Nerve produced out of the Spine to the *Par Vagum*, and the Ramifications carried to the Stomach. Here also are represented the Beginnings and Distributions of the seventh, ninth and

fig. 1.

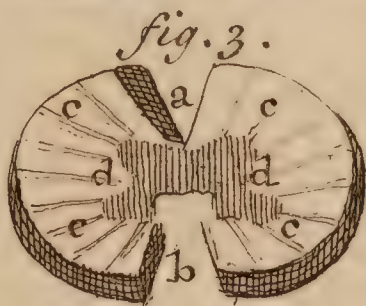
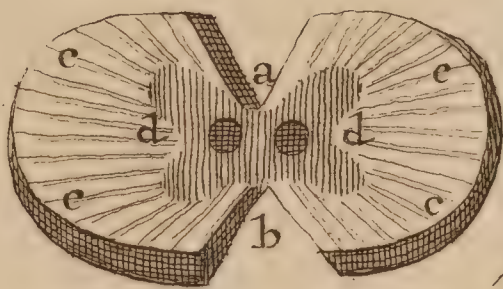
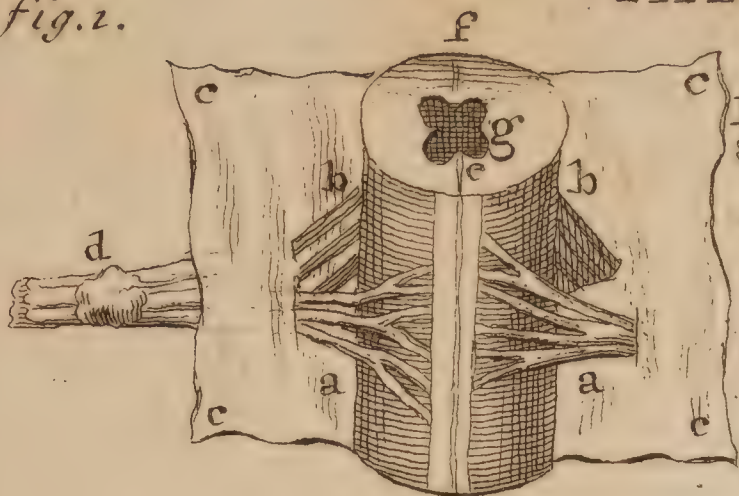


fig. 3.

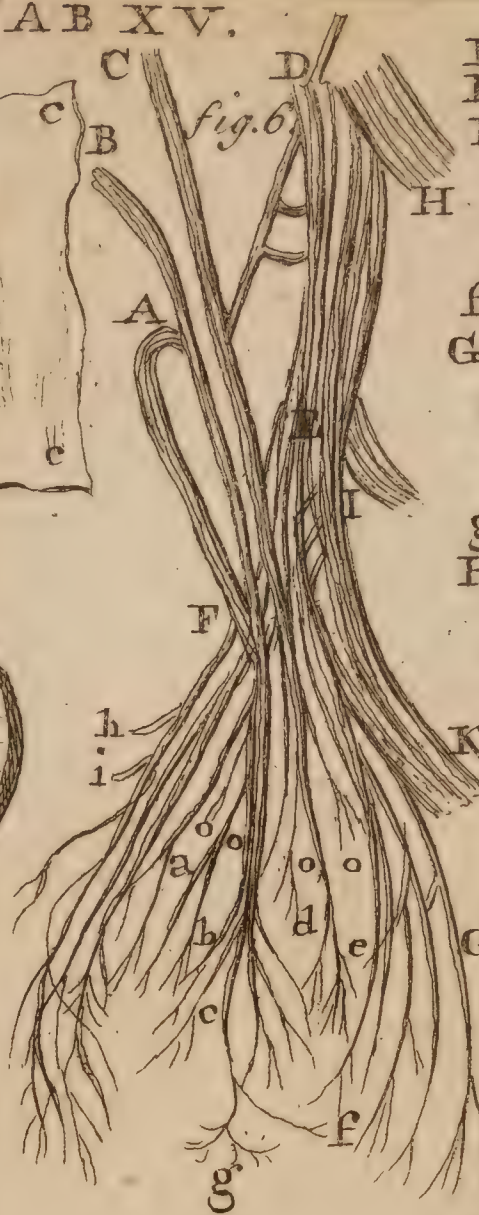


fig. 6.



fig. 2.



fig. 4.

fig. 5.

and tenth Pair of Nerves, and of those of the Diaphragm ; also the Originations and Insertions of the Nerves of the *Præcordia* and the *Viscera*, with the Originations of the vertebral Nerves, and their communications with the former.

AA, The Nerve of the fifth Pair, with its two Branches AA, the upper of which tending strait, distributes it self into the Muscles of the Eye and Face, into the Nose, Palate, and the upper part of the Mouth ; and besides, it reflects two Branches aa, which make two of the Roots of the Intercostal Nerve ; the other lower Branch of the fifth Pair tends downwards, and is dispersed into the lower Jaw-bone and all its parts.

aa, Two Shoots sent down from the upper Branch of the fifth Pair, which meeeting with the other Branch b, reflected from the Nerve of the sixth Pair, make up the Trunk of the Intercostal Nerve, D.

B, The Nerve of the sixth Pair, tending strait downwards into the Muscles of the Eye, out of whose Trunk the Branch b, which is the third Root of the Intercostal Nerve, is reflected.

b, The third Root of the Intercostal Nerve.

C, The Origin of the *Auditory Nerve*, or of the seventh Pair, with its double Process, *viz.* the soft and hard.

c, The softer Branch of it, which is wholly distributed into

the inward part of the Ear, *viz.* into the Muscles of the *Hammer*, and into the *Cochlea*.

d, The harder Branch of it, which arising whole without the Skull, and being inosculated with the Shoot of the eighth Pair e, constitutes with it a single Nerve, which presently is divided into more Branches ; of which,

1, Is bestowed on the Muscles of the *Tongue*, and of the *Os Hyoides*.

2, Again into more Shoots, the upper of which,

3, Into the Muscles of the Face and Mouth,

4, Into the Muscles of the Eye-lids and Forehead,

5, Into the Muscles of the Ear.

D, The Trunk of the Intercostal Nerve, consisting of the threeaforesaid Roots, which presently after forms the *Gangliiform Plexus*, which *Plexus* of the Intercostal Nerve, just without the Skull, seems to be the highest Knot.

E, The Original of the Nerve of the *Par Vagum*, or eight Pair, consisting of many Fibres, with which the Nerve G, arising out of the Spine, joins, and being inosculated with them, passes together through the Skull, after which it returns again, and having made a communication with some neighbouring Nerves, is bestow'd on the Muscles of the Shoulders and the Back.

e, A Shoot of the eighth Pair, meeting with the Auditory Nerve.

fff, Other

fff, Other Branches of the *Par Vagum* going into the Muscles of the Neck.

G, The principal Branch of the same Pair hid in the Ganglioform Process.

H, The upper Ganglioform *Plexus* of the *Par Vagum*, which admits a Branch k, out of another neighbouring *Plexus* of the Intercostal Nerve.

h, A Branch out of the aforesaid *Plexus* of the *Par Vagum* going into the Muscles of the *Larynx*, a considerable Branch of which, going under the Scutiform Cartilage, meets with the returning Nerve, to which it is joyn'd.

i, A Branch sent from the cervical *Plexus* of the Intercostal Nerve into the Trunk of the *Par Vagum*.

K, The lower *Plexus* of the *Par Vagum*, from which very many Nerves go to the Heart, and the Parts about it.

l, A remarkable Branch sent into the *Cardiack Plexus*.

m, Nervous Fibres distributed into the *Pericardium*, and Vessels joyning to the Heart.

n, The left recurrent Nerve, which, being reflected upwards towards the Scutiform Cartilage, near which it compasses about the Trunk of the *Aorta*, in its ascent sends many Branches †††† to the *Aspera Arteria*, and then meets with a Shoot h, sent from the Ganglioform *Plexus*. This returning from that *Plexus*, sends some Shoots towards the Heart.

L, The right recurrent Nerve,

which being reflected much higher, binds about the Axillary Artery.

o, A notable Branch sent down from the Trunk of the *Par Vagum* of the left side to the Heart, and presently dividing, one Branch passes about the Trunk of the Pneumonick Vein, the other gently touching the back part of the Heart, is dispers'd into more Branches which lie over its Superficies; from this Pair is sent a *Cardiack Branch* from the Trunk of the other side.

p, A Branch of the aforesaid Shoot going about the Pneumonick Vein.

q, Another Branch of the same, sending many Shoots to the Heart, which lie over its hinder Superficies.

rrr, Small Branches sent out from the Trunk of the *Par Vagum*, which are joyn'd in a long Tract with the *Oesophagus*, being turn'd back from their proper place.

sss, Many Branches cut off, whose Shoots being distributed into the Substance of the Lungs, variously straiten and bind about the Sanguinary Vessels.

TTT, The Trunk of the *Par Vagum* is divided into two Branches, viz. outward and inward, both of which inclining towards the like Branches of the other side, are joyn'd to them, and after a mutual Communication, make up the two Stomachick Branches, viz. the upper and lower.

VV, The internal Branches, which

which being united in X, constitute the beginning of the inferior Stomachick Branch.

W W, The outward Branches, which being united in the Figure to be added to this, make the other Stomachick Branch.

X, The joining of the inward Branches.

F, The beginning of the Nerve of the ninth Pair, with many Fibres, which being united, make a Trunk, which is carried towards the Tongue, and in its Progress sends down two Branches.

⊙⊙, The first Branch tending downwards, which being united to a Branch of the tenth Pair, is bestow'd on the Sternothyroidal Muscle.

⊙⊙, The second Branch is sent into the Muscles of the *Oesophagus*.

⊙, The Trunk of this Nerve passing into the Body of the Tongue.

G, The upper Ganglioform Plexus of the Intercostal Nerve, which is the last Knot of this Nerve coming out of the Skull.

α, A Branch out of this Plexus sent into the neighbouring Plexus of the *Par Vagus*.

bb, Two nervous Processes, by which this Plexus communicates with the Nerve of the tenth Pair.

γ, A Shoot sent down into the *Sphincter Gulae*.

Γ, The middle or *Cervical Plexus*, which being proper to a Man, lies nigh the middle of the Neck, in the Trunk of the *Intercostal Nerve*.

δ, A noted Branch out of the second vertebral Pair, going into this Plexus, whereby this communicates with the Nerve of the *Diaphragm* in its first Root.

εε, Two Branches going from the same Plexus into the Trunk of the Nerve of the *Diaphragm*.

ζ, Many nervous Fibres going out of the *cervical Plexus* into the current Nerve, and to the sanguinary Vessels to the Trunk of the *Trachea* and *Oesophagus*.

θ, A Branch from the same into the Trunk of the *Par Vagus*.

χ, Another noted Branch going into the returning Nerve.

ηη, Two remarkable Shoots sent towards the Heart, which another Branch λ arising a little lower follow; these being carried downwards between the *Aorta* and the *Pneumonick Artery*, and meeting with the like Branches of the other side, constitute the *Cardiack Plexus* Δ, from which the chief Nerves proceed that are bestowed on the Heart.

λ, A Branch proceeding a little lower from the Intercostal Trunk, which goes with the former to the *Cardiack Plexus*.

Δ, The aforesaid *Cardiack Plexus*.

μ, A Link going from the same, which compasses about the *Pneumonick Artery*.

ν, The lower Link inclosing the *Pneumonick Vein*.

Ξ, The Intercostal Nerve demers'd into the Cavity of the *Thorax*,

Thorax, where it binds the axillary Artery.

ξξξξ, The four vertebral Nerves sent down into the *Plexus* of the *Thorax*, the upper of which binds the vertebral Artery.

ooo, Three noted Branches sent down from the same *Plexus*, which lie over the fore-part of the Heart, as the Nerves p, q, coming from the Trunk of the *Par Vagus*, give Branches to its back-part.

π, The vertebral Artery bound about by the aforefaid Nerve.

ςςς, Nervous Shoots covering the fore-part of the Heart.

τττ, Branches and nervous Fibres sent into its back-part.

Θ, The inferior *Plexus*, properly call'd the Intercostal or Thoracick, into which four Vertebrals, beside the Intercostal Nerve, are inserted, the uppermost of these in its descent passes about the vertebral Artery.

I, The Intercostal Nerve descending through the Cavity of the *Thorax* just by the Roots of the sides, where in its whole Progress it admits a Branch from between each *Interrodium* of the *Vertebrae*.

H, The Nerve of the tenth Pair, consisting of many Fibres in its beginning, and passing out between the first and second *Vertebrae*, where it presently sends forth two nervous Processes b b, into the superior *Plexus* of the Intercostal Nerve.

*, Its Branch, which being

united to the Shoot of the ninth Pair, is bestow'd into the Sternothyroidal Muscle, immediately lying upon the *Aspera Arteria*.

□, The Branch sent into the posterior Muscles of the Neck.

Δ, A Branch sent into the pathetick Spinal Nerve.

***, Shoots from the chief Branch of the same Nerve, sent into the Sternothyroidal Muscle.

L, The Origin of the first vertebral Nerve, which in this, as well as in all other Vertebrals, consists of many Fibres, one Band of which going out of the lower Margin of the Spinal Marrow, and the other from the upper meeting one another, grow together into one Trunk, which presently is divided into divers Nerves distributed many ways.

p, A Shoot from this Nerve into the Branch of the tenth Pair.

σ, Another Shoot into the Spinal Pathetick Nerve.

s, A noted Shoot sent forth upwards into the Muscles of the Neck.

T, A Shoot from the crooked Nerve into the anterior Muscles of the Neck.

Z, A Nerve from this Pair into the first brachial Nerve, out of which the Nerve of the Diaphragm hath its highest Root.

M, The Origin of the second vertebral Nerve, whence the highest brachial Branch (V) proceeds, and in which the Nerve

Nerve of the Diaphragm is first rooted. This brachial Nerve in Quadrupeds arises high to the 4th or 5th *Vertebra*, and therefore the *Radix* of the Diaphragm is placed lower.

V, The vertebral Branch going to the Arm.

r, The Nerve of the Diaphragm, a Branch of which s goes from the Cervical *Plexus* to its Root, and a little below two other Branches $\epsilon\epsilon$ pass into its Trunk from the same *Plexus*; this Communication is peculiar to Humane Bodies.

q, The other Root of the Diaphragm from the second and third brachial Nerve.

χ, The lower Trunk of the Nerve of the Diaphragm removed, which in its proper place passing through the Cavity of the *Thorax* without any Communication, goes strait to the Diaphragm, where being stretch'd out into three Branches, it is inserted in its musculous part.

ψψψψ, The other brachial Nerves, out of whose Roots Branches go into the Intercostal *Plexus*.

ω, ω, ω, ω, The Origins of the vertebral Nerves, from the several Roots of which, a Branch is carried into the Intercostal Nerve.

ψ, ψ, The last Origin of the Spinal accessory Nerve, that goes to the *Par Vagum*, beginning with a sharp Point.

♀, The ascending Trunk of the same Nerve, which in its whole ascent passing by the side

of the Spinal Marrow, passes through the midst of the Origins of the vertebral Nerves, and receives Fibres at the Trunk of the Marrow.

♂, The descending Trunk of the same Nerve, which going from the *Par Vagum*, is reflected outwards, and after it hath had communication with the Nerves of the ninth and tenth Pair, is bestow'd wholly upon the Muscles of the Shoulders.

♂, The lower Process of the same Nerve.

The following Characters are repeated on the lower part of this Figure, which makes the 11th Table of Dr. *Willis*, and shew the inferior Ramifications of the Nerves of the *Par Vagum*, and of the Intercostals, distributed to the Ventricle and the *Viscera* of the whole *Abdomen*. Likewise the Origins of the vertebral Nerves are described, which stand over-right the former, and are inosculated with some of them. The Figure in these, and in four-footed Animals, are almost alike, so that this Figure may be common to both.

A, The lower Stomachical Branch, which is made up of the internal Branches of both sides of the *Par Vagum*, being united together, and covering the bottom of the Ventricle, disperses Branches on every side in the whole Tract.

B, The upper Stomachical Branch, which is made of the external Branches of both sides of

of the *Par Vagum*, being united together, creeps through the top of the Ventricle.

C, The Coalition or joyn-
ing together of the external
Branches.

D, The *Plexus Nervosus* of the
Fibres of both the Stomachical
Nerves, united together nigh
the Orifice, and as it were
woven into a Net.

aa, The Extremities of both
the Stomachical Nerves, which
there meet with the Nerves of
the Liver and communicate with
them.

EE, The Intercostal Nerve
descending on either side nigh
the Roots of the Ribs, and in
its whole descent receiving a
Branch from the several verte-
bral Nerves *ε ε*.

F, A Branch going out of the
Intercostal Nerve of the left
Side, and sent down towards the
Mesenterick *Plexus*.

G, The same Mesenterick
Nerve divided into two, sends
the greater Branch into the
Plexus, which is the Stomachi-
cal and the Splenetick, and the
lesser into the *Plexus Renalis*.

H, The like Mesenterick
Branch coming from the Inter-
costal Nerve of the right Side,
and bending towards the Mesen-
terick *Plexus*.

J, This Nerve being divided,
parts with its great Branch to
the Hepatick *Plexus*, and the
lesser into the *Plexus Renalis*.

h, The chief Mesenterick
Plexus of the left Side, which is
the Stomachical and Lienary;
from which many little com-

panies of Nerves, or numerous
Conjugations, are sent out many
ways.

4, The Renal Mesenterick
Plexus of the left Side, into
which, besides the Mesenterick
Branch,

ββ, Two other Nerves are
immediately carried out of the
Intercostal Nerve.

γγγ, From this *Plexus* placed
nigh the Gall-Bladder, more
Nerves and Fibres are sent into
the Kidney.

δδ, Nerves and Fibres, by
which this *Plexus* communicates
with the greatest *Plexus* of the
Mesentery.

ζ, The chief bundle of Nerves
tending out of the former *Plexus*
(h) into the Spleen, which it
having reach'd, reflects from
thence into the bottom of the
Ventricle.

η, The second Conjugation of
the Nerves from the aforesaid
Plexus into the bottom of the
Ventricle, whose Fibres com-
municate with the Fibres and
Branches of the lower Stomachi-
cal Nerve.

θ, The third Conjugation of
Nerves between this *Plexus* and
the neighbouring Hepatick δ.

ι, The fourth Conjugation of
Nerves between this and the
greatest *Plexus* of the Mesente-
rick θ.

♀, The Renal Mesenterick
Plexus of the right Side, into
which (as in its fellow) beside
the Mesenterick Branch,

KK, Two Nerves produced
from the Intercostal Nerve.

λ, The Nerves and Fibres
between

between this *Plexus* and the greatest of the Mesenterick.

μ , A noted Branch between this *Plexus* and the neighbouring Heparick ν .

V, A noted company of Nerves and Fibres from this *Plexus* into the Kidney, which climbing up the emulgent Vessels, variously pass about them.

δ , The superior Mesenterick *Plexus* of the right Side, which also is the Heparick.

σ , A great Conjugation of Nerves out of this *Plexus* into the Liver and Gall-Bladder, out of which likewise many Branches are sent into the *Pylorus* and *Pancreas*. The Nerves and Fibres of this in its ascent towards the Liver, cover the Hepatick Artery as it were, by making a Net, and almost hide its Trunk; the Branches of these meet with the tops of the Stomachical Nerves $\alpha\alpha$.

$\pi\pi$, Shoots distributed about the *Pylorus*.

$\rho\rho$, Other Shoots dispers'd into the *Pancreas*.

$\sigma\sigma$, Nerves reaching out between this *Plexus* and the greatest of the Mesentery. This *Plexus* communicates with the neighbouring Renal by (μ) and with the Stomachical by (θ). The greatest Mesenterick *Plexus*, out of which a great bundle of Nerves arising under the great *Glandula* of the Mesenterick, from thence is dispers'd every where about into very many Branches and Shoots, and are distributed into all the Intestines (except the *Rectum*).

These Nerves and Fibres reaching out on every side, accompany the Mesenterick Arteries and Veins, and variously pass about them in their whole progress.

$\tau\tau$, Nervous Branches from this *Plexus* into the Womens Testicles or uterine *Glandula*, which meet with the Branches of the vertebral Nerves of the 20th and 21st Pair, sent into the same Parts, and are inosculated with them.

$\upsilon\upsilon$, The vertebral Nerves which go into the Womens Testicles.

δ , The lowest *Plexus* of the Mesentery placed far below the former, and having for its Origin three Nerves arising lower from the Intercostals.

$\phi\phi\phi$, Three Nerves sent down on either side from the Intercostal Nerve into the lowest *Plexus* of the Mesenterick.

$\chi\chi$, A Nerve stretch'd out from that *Plexus*, directly into the greatest *Plexus* of the Mesentery, which in its Passage receives on both sides some Branches from the Intercostal Nerve, viz. 44. 5. 5. 5. and it self send two Branches into the Womens Testicles.

$\downarrow\downarrow$, Two Branches from the aforesaid Nerve into the Womens Testicles.

ϕ , Another small *Plexus* standing a little above this lowest.

ω , A nervous Process from the aforesaid lowest *Plexus*, stretch'd out into a small neighbouring *Plexus*.

a, From

a, From the least *Plexus* ☿ a noted Nerve being carried into the greatest *Plexus* of the Mesentery, which in its whole ascent goes under the *Rectum* and part of the *Colon*, and inserts many Branches in the same.

b, Another Branch sent downwards from the same *Plexus*, which goes under the lower part of the same straight Intestine, and bestows upon it many Shoots.

cc, Two Nerves sent downward from the lowest *Plexus* of the Mesentery D, which being sent down into the *Pelvis* of the *Abdomen*, go under the two *Plexusses* there K K, viz. one placed on either side.

K K, A double *Plexus* placed within the *Pelvis*, whose Nerves are employ'd in the several Excretions there made, (viz.) the Urine, Excrement, and Seed; these send out Nerves dd, towards the lowest Mesenterick *Plexus*.

dd, A Nerve ascending from the aforesaid *Plexus* on either side nigh the side of the *Rectum*, and sends Shoots into it, which double *Plexus* meets with another Nerve b, descending from the least *Plexus*.

ee, Two Nerves from the same *Plexus* into the Womb.

f, A Nerve from the same *Plexus* into the Bladder.

g, A Nerve into the *Prostata*.

h, A Nerve out of the Root of the 28th vertebral Pair, into the Muscle of the *Anus*.

i, The 29th vertebral Pair, from which

k, A Nerve into the Sphincter, and the other Muscles of the *Anus*.

l, A noted Nerve on both sides from that Pair into the *Penis*.

M, Another shorter Branch into the Muscles of the *Penis*.

LL, The Intercostal Nerve below the Kidneys.

m, A little Nerve from the vertebral Branch, which passes into the *Cremaster* Muscle of a Man's Testicles.

n, The 21st vertebral Pair, whose origin being placed behind the Kidneys, lies hid; from this Nerve more Shoots are sent out on both sides into the Testicles of the Female Sex, which meet with other mesenterick Shoots distributed to the same Part.

o, A Nerve out of the 22d vertebral Pair, from which also some Branches are sent into the Womens Testicles.

ppp, &c. Nerves which pass to the Thighs, of which those that rise higher receive in their descent Branches from the Nerves arising lower.

q, The Intercostal Nerves mutually bending one to another near the beginning of the *Os Sacrum*, communicates by the cross Processes r.

r, Another cross Process within the bending of the *Os Sacrum*, joining the two Intercostal Nerves.

S, Both the Intercostal Nerves end in small Fibres, which Fibres

fig. 2.

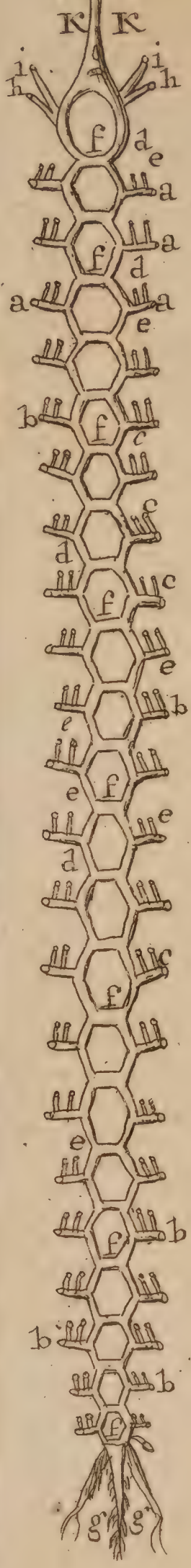


fig. 1.

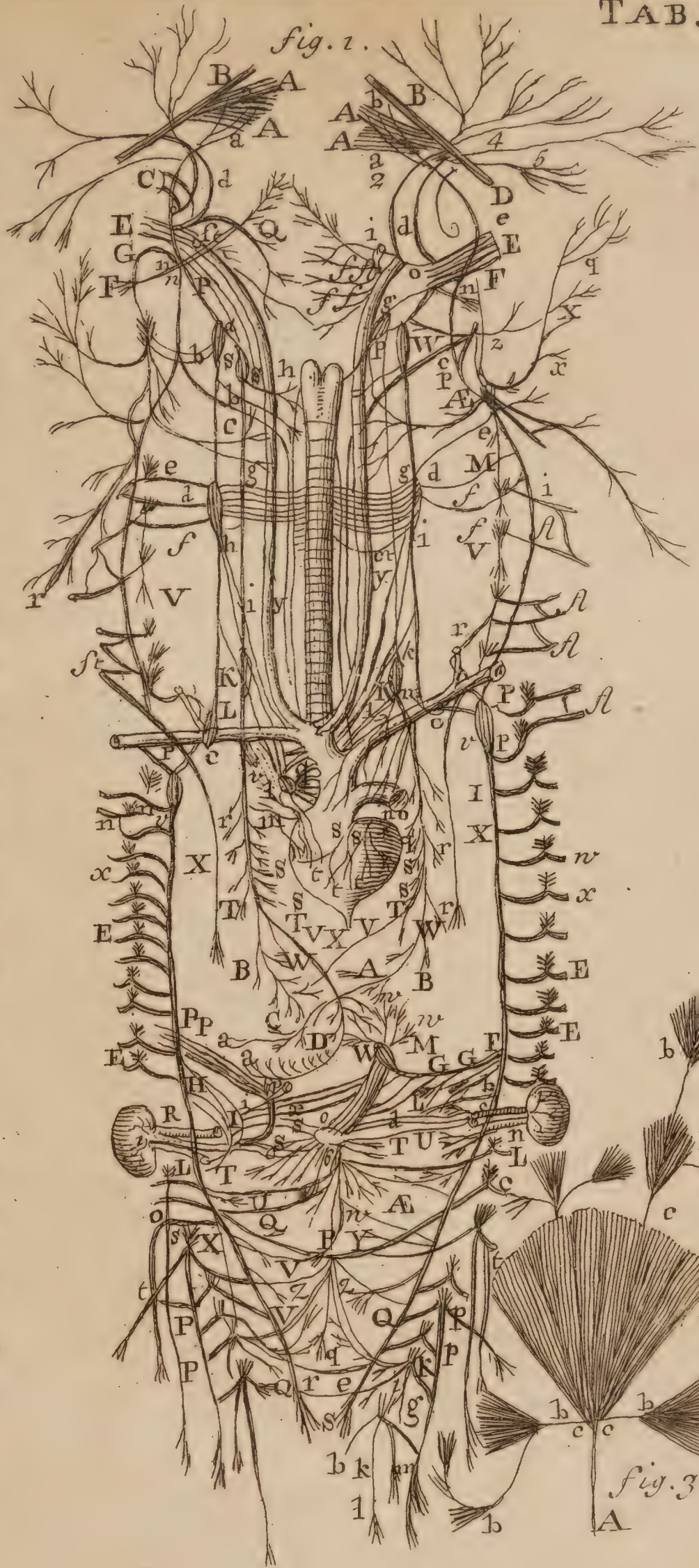


fig. 3.



Fibres are distributed into the very Sphincter of the *Anus*.

t, A Nerve from the 24th vertebral Pair, which is carried into the inguinal Glandules.

VVV, Shoots sent down from the intercostal Nerve on both sides into the Body of the Ureters.

X, A Nerve which goes to the Testicles and the *Cremaster* Muscle cut off where it goes out of the *Abdomen*.

FIG. II.

The Spinal Artery that lies on the fore-part of the *Medulla Oblongata* within the Bony *Specus* of the *Vertebrae*, running along from the *Occiput* to the *Os Sacrum* like Net-work.

aaa, Arterial Shoots from the vertebral Artery ascending between the holes of the Spinal Processes, sent down towards the Spine.

bbb, Arterial Branches sent down from the *Aorta* towards the Spine.

ccc, &c. An arterial Shoot reaching out of every aforesaid Branch into the Spinal Marrow.

ddd, &c. Other Shoots from each of the aforesaid Branches passing to the fore-part of the Spinal Marrow.

eee, The aforesaid Arterial Branches, which as soon as they are carried to the bony *Den*, pre-

sently become forked, and send forth little Branches into either part, which on both sides communicate with the next Branch of the same side, and by the cross Process with the Fellow-Branch of the other side.

fff, The joining together of the Arteries of either side by the cross Branch.

gg, Arterial Branches going out of the *Os Sacrum*.

hh, Arterial Branches going to the *Meninges* of the hinder part of the Head.

ii, Arterial Branches going out of the Skull with the Nerves of the Seventh Pair.

kk, Shoots reaching out into the wonderful Net, which in their Progress are inosculated mutually among themselves, and at length with the Carotid Arteries.

FIG. III.

Part of the Pulmonick Nerve view'd with a Microscope, to shew its Branchings on the Lobules of the Lungs.

A, The chief Trunk.

bb, The *Fibrille* cut off and display'd, which pass to the little Lobes of the Lungs.

ccc, The small Stemms of Nerves continued from each *Fasciculus* of nervous Fibres, from whence others are propagated to the next little Lobe.

T A B. XVII.

The 5th, 6th and 8th from Casseius, the rest from Bidloo.

FIG. I.

THE External parts of the Eye.

A, The Eye-brow, B the upper Eye-lid, C the lower, D the internal Angle of the Eye, in which, part of the *Glandula Lachrymalis* is seen. E, the external Angle, F the Hairs of the upper, and G the lower Eye-lid.

FIG. II.

A, The Skin with the *Musculus* or *Arbicularis Palpebrarum* remov'd.

B, The Bone of the upper part of the Orbit bored.

C, The great Lachrymal Gland, *in situ*.

D, A faint appearance of the excretory Ducts of the Lachrymal Gland. See the following Figure.

E, Divers little Glands interspers'd with the Ducts.

FIG. III.

The Lachrymal Glands within the Orbit of the Eye, represented somewhat bigger than the Life.

AA, The upper part of the Bones of the Orbit.

BC, &c. The superior Lachrymal Gland.

DD, Its excretory Ducts, first observ'd by *Meibomius*, and call'd *Hygrophthalmicos* by *Borrichius*, and by *Segerus Hygroclepharicos*, because they discharge themselves of their Lymphic Humour within the Orbit and *Palpebra*.

EE, Divers little Glands dispers'd between the last mention'd Ducts.

FG, The Cartilaginous Rim of the Eye-lids connected with Membranes.

HHH, The Hairs of the upper Eye-lid turn'd somewhat upwards, which by the Microscope appear to have lateral Fibres.

I, The Lachrymal Gland placed in the internal Angle of the Eye.

KK, The little Bones of the Nose broke off to shew the following Ducts,

ML, which convey the superfluous Moisture of the Lachrymal Ducts into the Nostril of the same side.

FIG. IV.

The Muscles of the Eye, &c.

A, The *Musculus Rectus oculorum attollens*.

aaa, The Motary Nerves of the Eye.

B, The *Deprimens*.

C, The *Adducens*.

D, The *Obliquus inferior*.

E, The *Abducens*.

F, The *Obliquus superior*.

G, The

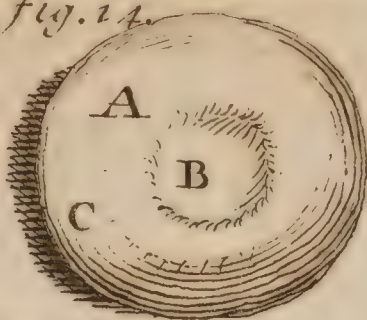
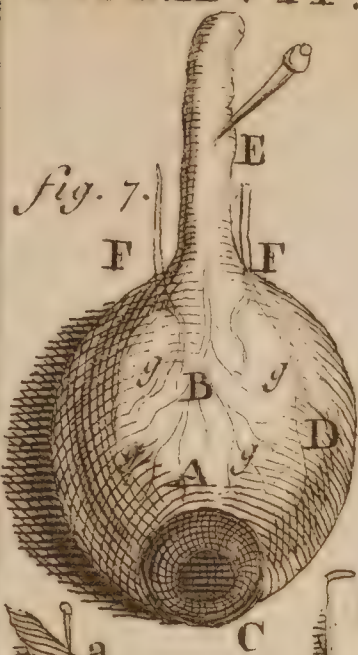


fig. 12.

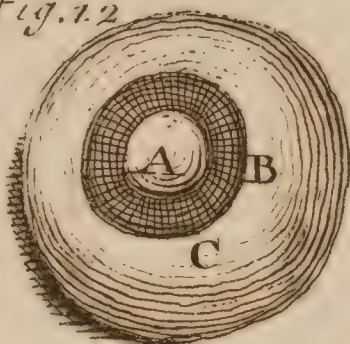


fig. 6.

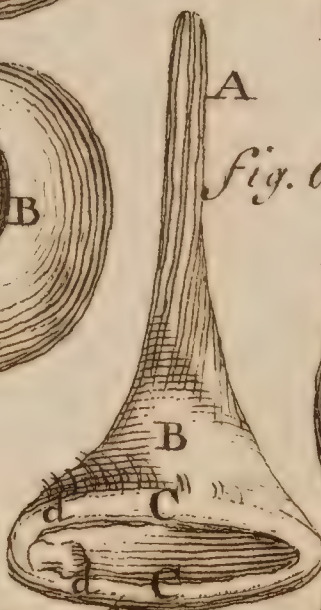


fig. 8.

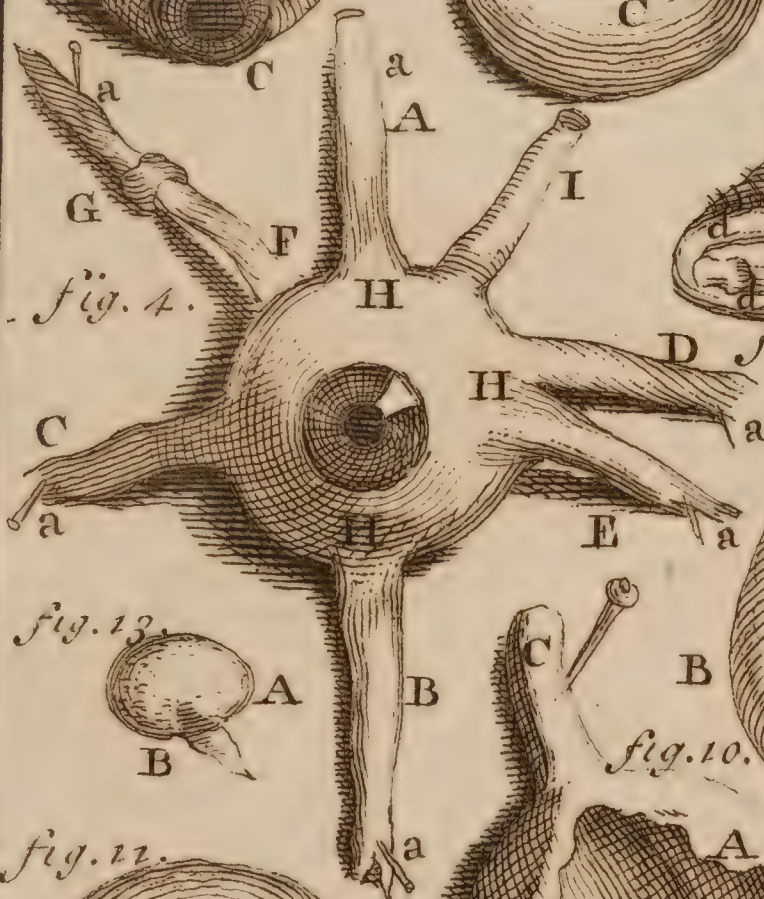
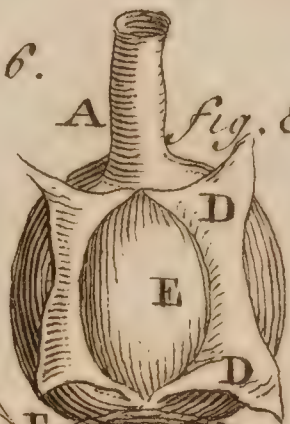


fig. 5.

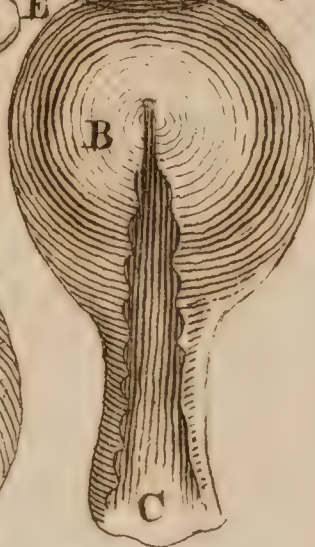
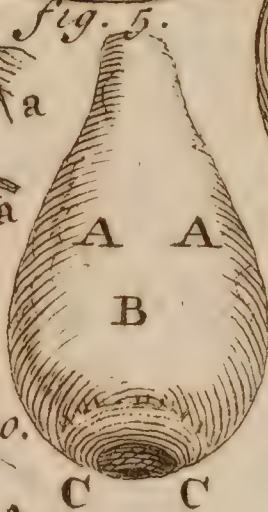


fig. 13.

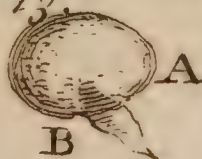


fig. 10.



fig. 11.



fig. 9.

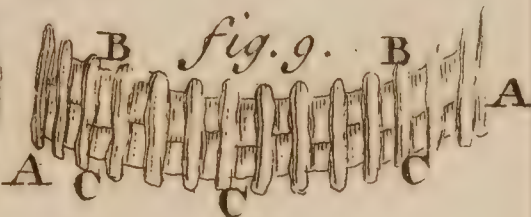


fig. 3.

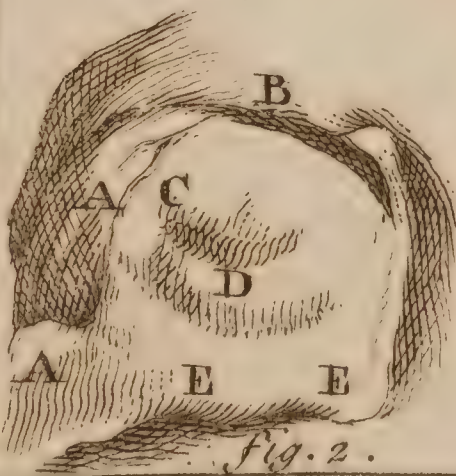
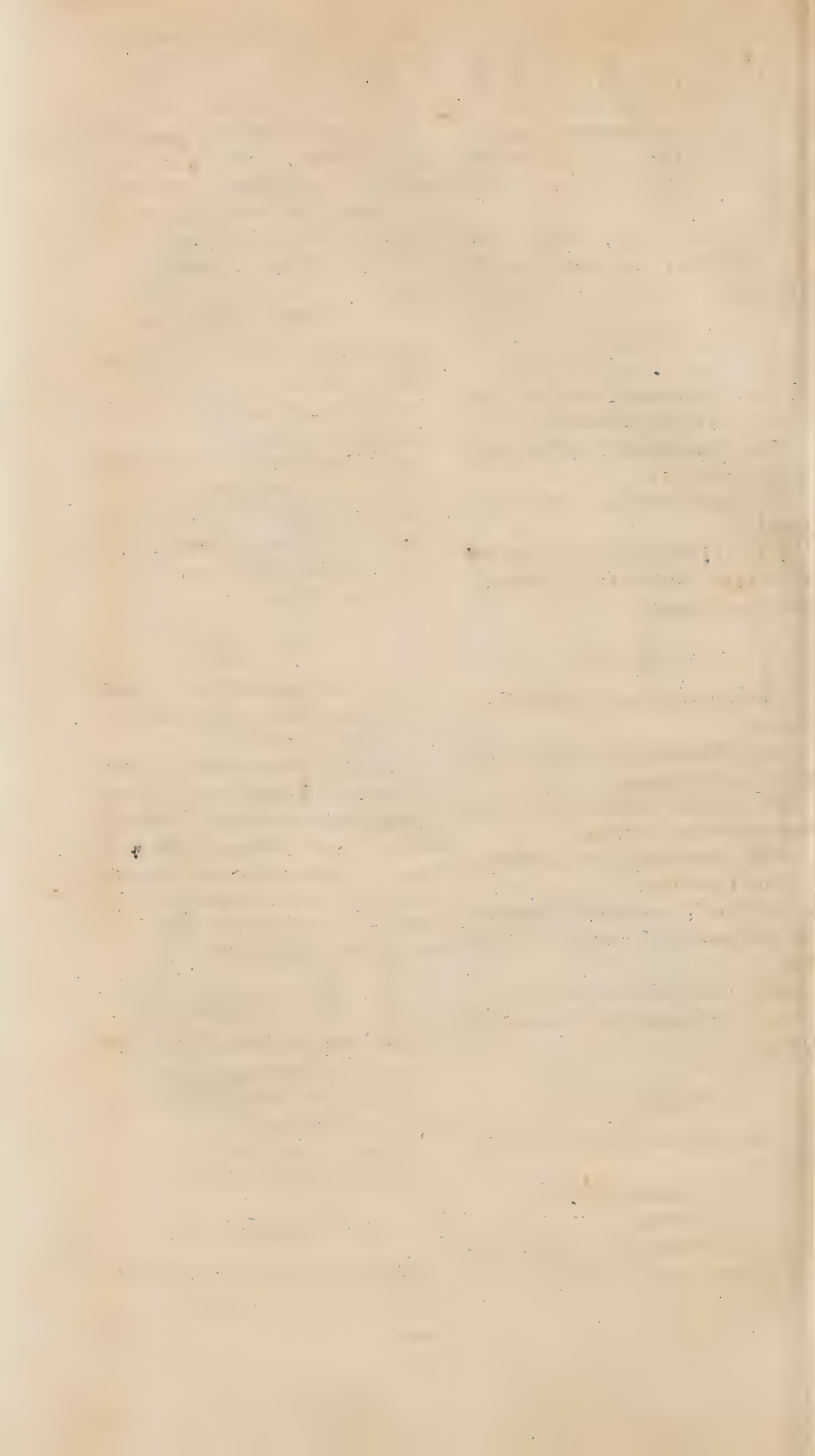


fig. 2.



G, The *Cartilaginous Trochlea*.
HHH, The Tendinous Expansions of the Muscles of the Eye.

I, The Optick Nerve implanted into the back part of the Eye.

FIG. V.

The Eye taken out of the Orbit with the Fat about it.

AA, Fat growing to the back part of the Eye.

B, The Muscles not separated.

CC, That part of the Eye to which the Tendons of the Muscles do not reach.

FIG. VI.

The Eye-lids with their Muscles.

AA, The Muscle of the *Palpebrae* call'd *Levator*.

B, Its thin Tendinous Expansion at its Termination.

CC, The *Tarsi*, or Cartilages of the Eye-lids.

D, The Lachrymal Caruncle in the internal Angle of the Eye.

dd, The *Puncta Lachrymalia*.

E, The outward Corner of the Eye.

FIG. VII.

The external Tunicks of the Eye.

A, The *Tunica Adnata*.

B, The *Cornea*.

C, Its Fore-part, which is transparent, and properly call'd *Cornea*.

D, Its Back-part, properly call'd *Sclerotis*, which is thick and not transparent: Externally it is cover'd with the *Adnata*, and internally with the *Uvea*.

E, The Optick Nerve.

FIG. VIII.

The *Tunica Uvea* and *Retina* with the *Cornea* hanging down.

A, The Optick Nerve cover'd with the *Pia Mater*.

B, The *Sclerotis* turn'd off from the *Uvea*, and hanging to it.

C, The Inside of the *Sclerotis*.

D, The *Tunica Uvea* partly separated from the *Retina*.

E, The *Retina*.

FIG. IX.

AA, The *Ligamentum Ciliare*.

BB, Its Fibres that pass according to its breadth.

CC, Its Fibres that pass but half way; in which are inserted divers Lymphæducts: this Musculous Constructure with the *Uvea*, is movable, and straitens or widens the Dimensions of the *Pupilla* according to the different degrees of Light.

FIG. X.

The Membranes of the Eye without the Humours.

AA, The three Tunicks of the Eye together.

B, Part of the *Pupilla*.

C, The Optick Nerve.

FIG. XI. and XII.

The Vitreous and Chryſtallin Humours taken out together.

C 2

A, The

A, The Chryſtalline Humour.
 B, Parts of the Fibres of the
 Ciliar Ligament broken off and
 remaining on
 C, The Vitreous Humour.

FIG. XIII.

A, The Chryſtalline Humour
 taken out.

B, A Membrane rais'd from
 the Chryſtalline Humour.

FIG. XIV.

AC, The *Vitreus Humour*.

B, A Cavity in this Humour,
 in which the back part of the
 Chryſtalline is receiv'd.

T A B. XVIII.

FIG. I, II, III, IV, & V. from A. Lewenhoeck, the VIth
 from Henr. Meibomius. *The Five fiſt ſhews the Chry-
 ſtalline Humour of the Eye variously view'd with a Micro-
 ſcope. See the Philoſophical Tranſactions, Numb. 165.
 in the Year 1684. for the Month of November.*

FIG. I.

ABC, **T**HE Chryſtalline Hu-
 mour of its natural
 ſize.

B, That part of it next the
Tunica Cornea.

FIG. II.

The Threads conſtituting the
 Scales wonderfully diſpoſed.
 From the Center L, the Threads
 paſs three ſeveral ways, not that
 all the Threads paſs to the Cen-
 ter, for example, the ſhorteſt M K
 H N O F don't come ſo far, but
 reach to the *Axis* of the other
 ſide as the Threads ELK do
 here. They return from thence
 back, and are in this Section the
 ſhorteſt Threads H N. Theſe
 Threads HN are placed on the

other ſide near the *Axis*, and re-
 turning back again, are then
 O F; and O F coming from the
 other ſide nigh the *Axis*, is here
 again K M. To conclude, thoſe
 which are here the ſhorteſt
 Threads, are on the other ſide
 the longeſt, and *Vice verſa*. To
 preſent this clear to view, I
 have drawn with Lines the
 Threads compaſſing one of the
 Scales of the Chryſtalline Body
 ſeen on one ſide. See

FIG. III.

R T P S W Q. Tho' it ought
 to be a flattish round, I have
 here made it Globular, conſi-
 dering, that in this Repreſen-
 tation the Thread conſtituting
 each Scale may be the better
 diſcerned. P and Q are the middle
 Points

Points or *Axis*, of which P (in the foregoing Figure 2, denoted by L) the Threads issuing out of the Point P, in the foregoing Fig. 2. L, extended to V, where they are the shortest Threads; from whence they extend back again to P, where again they are the largest; and from P they again extend to W, where they are again the shortest: And thus also are extended the Threads from T to Q, and thence again to X, and from X to Q, and thus half the Course of every one of the Threads is demonstrated, since we must suppose this for an half round. In short, the Threads LI in Fig. 2. are here P S, and the Threads between L and M of that Figure, are here the Threads between P and X, and the Threads between L O in the foregoing Fig. 2. are here the Threads between P and T. So that the Threads in the foregoing Fig. 2. between F O LIKE are here in Fig. 3. the same with R T P S. Here is further to be observ'd, that the Threads constituting the Chrystalline Body, are thickest about R and S, and the nearer they approach to P or Q, they are the thinner. To conclude, when we view the foresaid Chrystalline Body with attention, as it cometh fresh out of the Eye, we find it to excel in transparency the purest Glass, notwithstanding it is compos'd of so many thousand Threads, where they lie so very close together, that one would wonder how the light

can pass through them in right Lines, which is absolutely necessary; for if it were otherwise, the Chrystalline Body would appear white, but not transparent.

FIG. IV. & V.

The same Agreement (says *Leuwenhoeck*) I found also in the Eyes of Hares and Rabbits, except that whereas the Threads constituting the before-mention'd Chrystalline Bodies, spread themselves from the *Center* in three distant Courses, here the Threads of each Scale spread themselves, but in two courses. Fig. 4. ABCD, representeth half the round of the Chrystalline Body of the Eye of a Hare or Rabbit, E is the *Center*, which lieth extended to the Apple of the Eye; these Threads constituting each Scale, which run as through the *Center* E, are on the other side the shortest, and appear like unto F or G; likewise F and G on the other side run through the *Center*. I have also caused the foregoing Figure to be drawn sidewise, the better to represent the thread-like appearance of each Scale. I suppose then, that the Threads, which in Fig. 4. are represented between E and F, are the same with those in Fig. 5. represented by I O. So that the Threads which come from the Point I (the same with E in the former Figure) end here in N and L, where they are the shortest; and those which extend to Q,

through or close to the *Center* M, where they are the longest, end there, or bend again on the other side, as the same do here. In short, those which here approach the *Center* I, are on the other side farthest from the *Center*.

FIG. VI.

The Lachrymal Duct passing towards the Nostril.

aa, The Continuation of the Lachrymal Duct from the *Puncta Lachrymalia* to the Extremity of the Nostril.

bb, The Excretory Duct that is proper to the Nostrils.

T A B. XIX.

From M. Du Verney.

FIG. I.

THE Ear in its natural Situation, together with the Arteries which are distributed to its Fore-part.

ABCD, The Ear, ABC its three *Plice*, D the *Auricula*, E the *Concha*, at

F, near E is to be seen the *Foramen* of the *Meatus Auditorius*. F, The Place of the *Tympanum*, or rather *Membrana Tympani*, the two prick'd Lines shew the length of the *Meatus*.

GG, Part of the *Os Squamosum* bored.

H, The *Musculus Attollens Auriculum* (or first Muscle) lying on the *Os Squamosum* after the Temporal Muscle is taken away.

I, Part of the *Os Fugale*.

K, The *Processus Styloides*.

L, The external Carotid Artery cut off about the Angle of the lower Jaw-bone.

M, The Branch which ascends by the Fore-part of the Ear.

N, Those that pass on the Back-part of the Ear.

P, A Branch that goes to the Ear itself.

O, Another Branch which passes to its Cartilage, and internal part of its *Concha*.

FIG. II.

The Ear drawn forward to shew its second Muscle, with the several Teguments of the Ear, and the Arteries which lie behind it.

A, The Ear turn'd forward.

B, Its second Muscle call'd *Retrahens Auriculam*, whose Fibres are here bared from their Membranes to shew their Progress.

C, The Cartilage laid bare, to shew the Insertion of the Muscle.

D, The true Skin of the Ear, under which the Fat is placed.

E, The *Membrana Nervosa*, according to Du Verney.

F, Part

TAB. XVIII.

fig. 2.

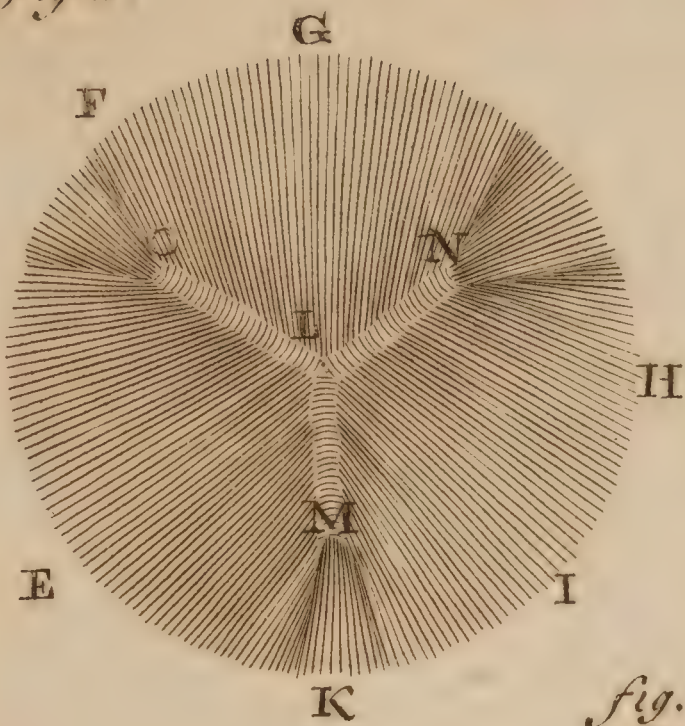


fig. 3.

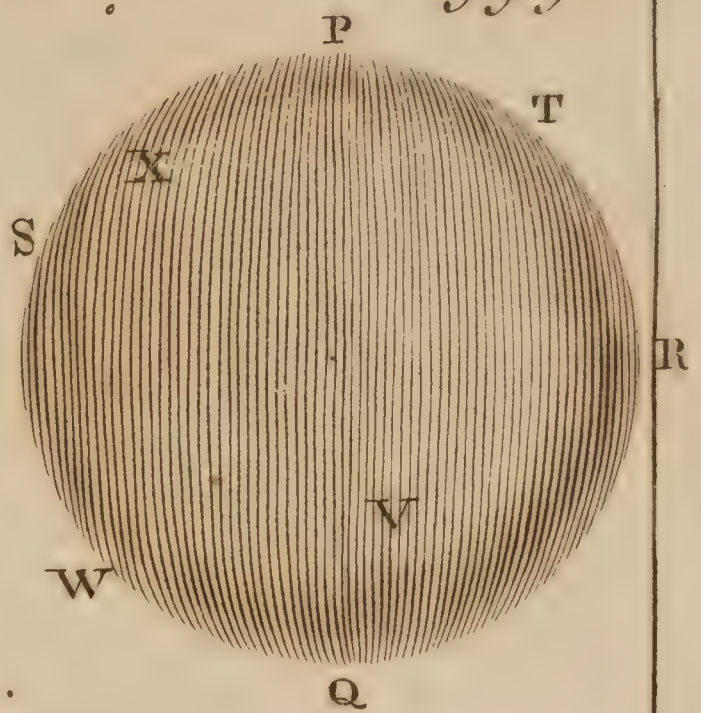


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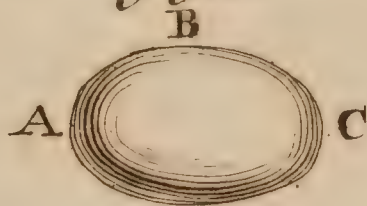


fig. 4.

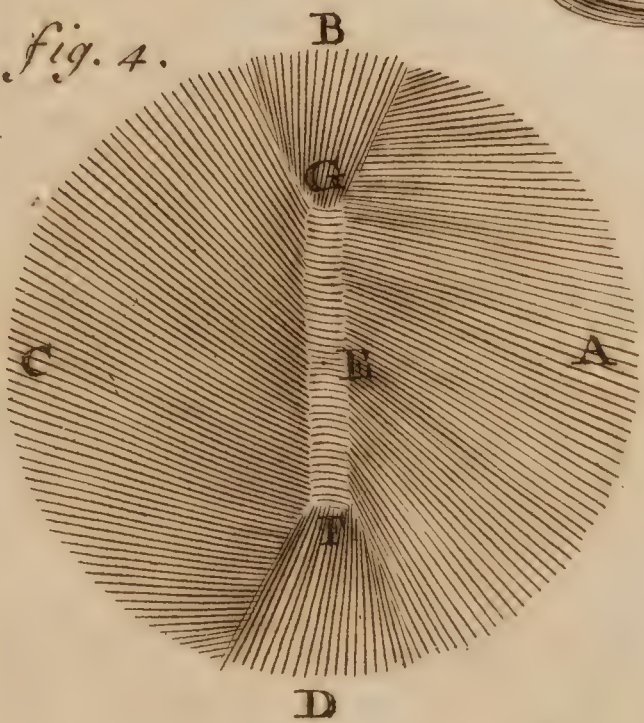


fig. 5.

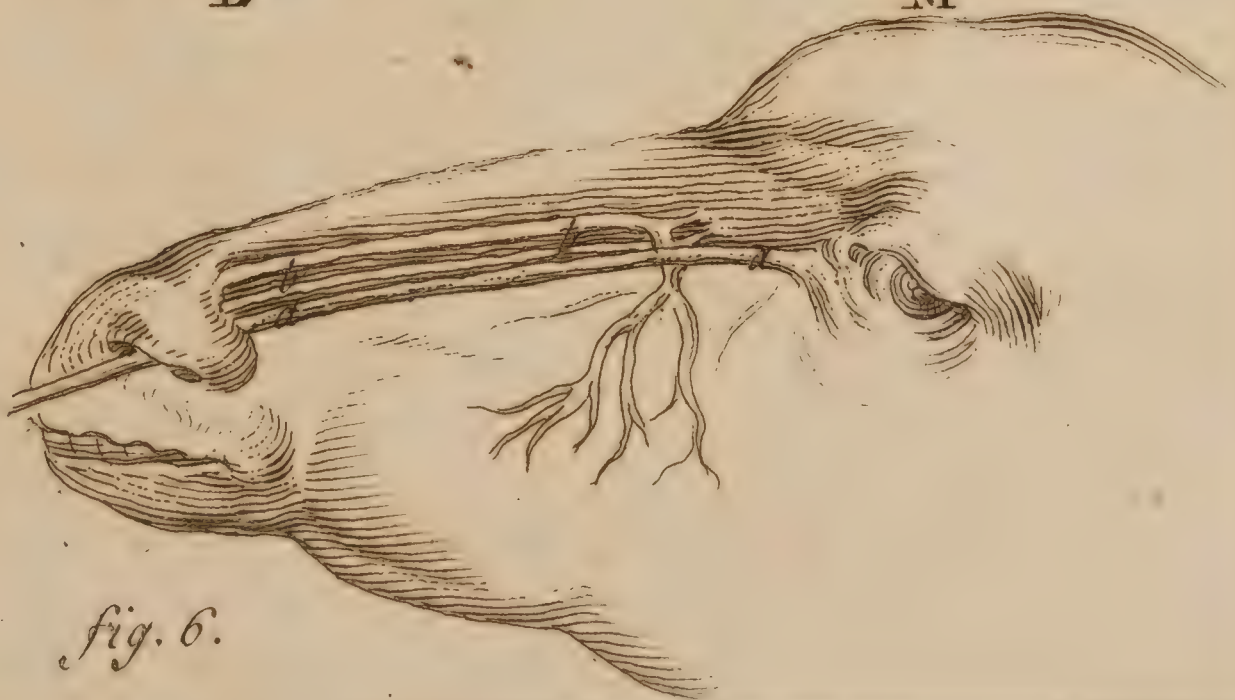
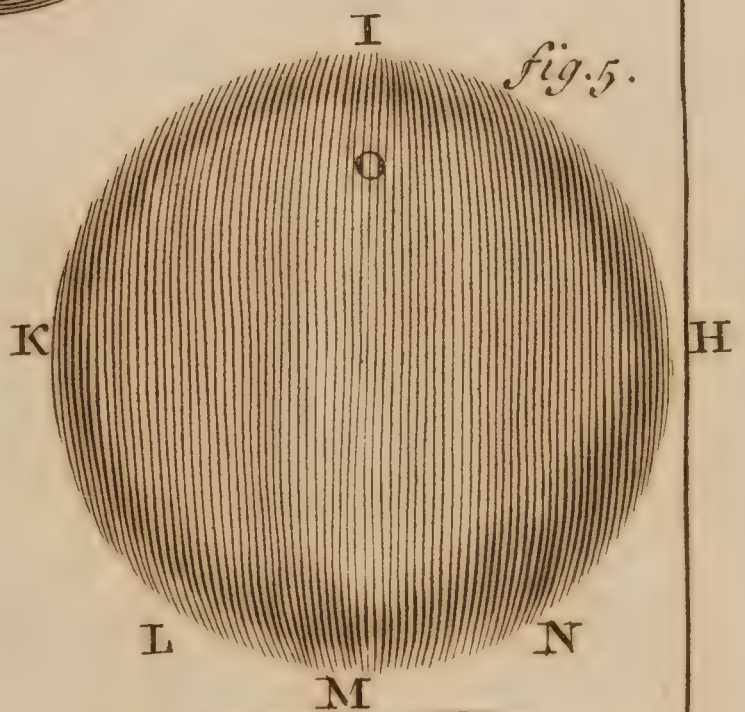


fig. 6.



TAB XIX.

fig. 2.



fig. 1.

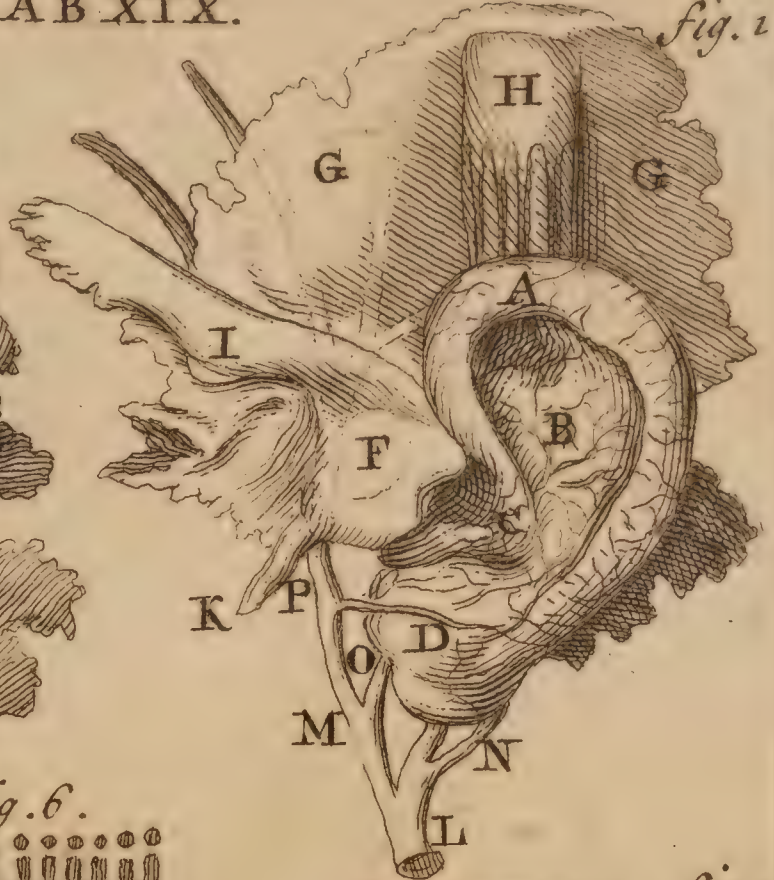


fig. 6.

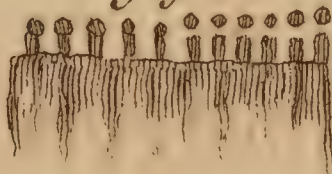


fig. 4.

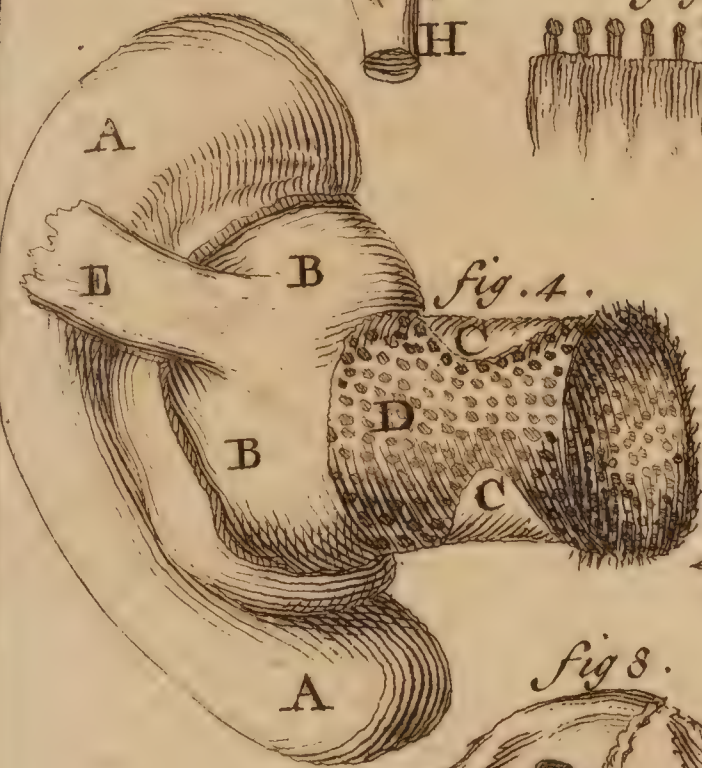


fig. 3.

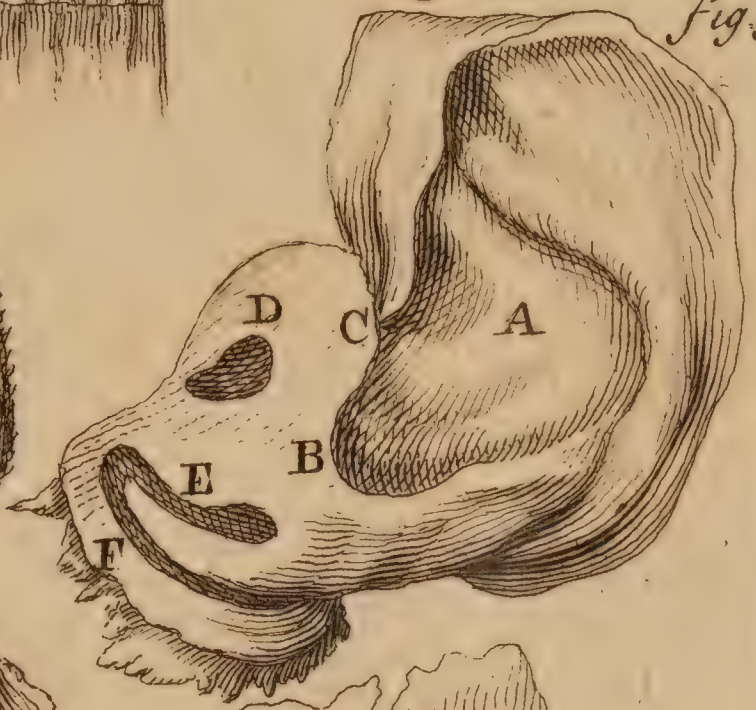


fig. 8.

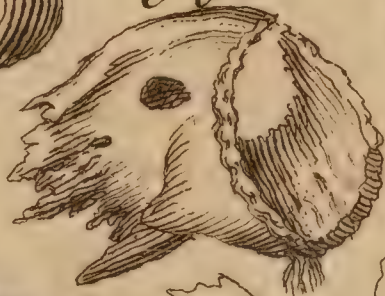
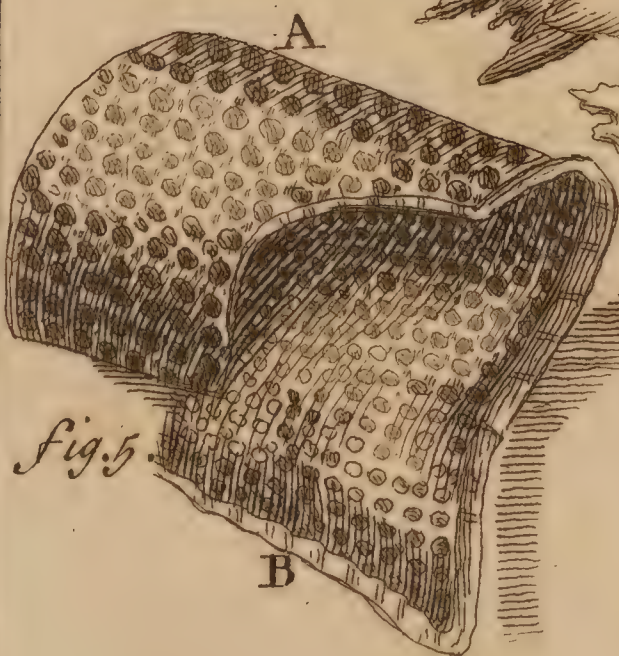
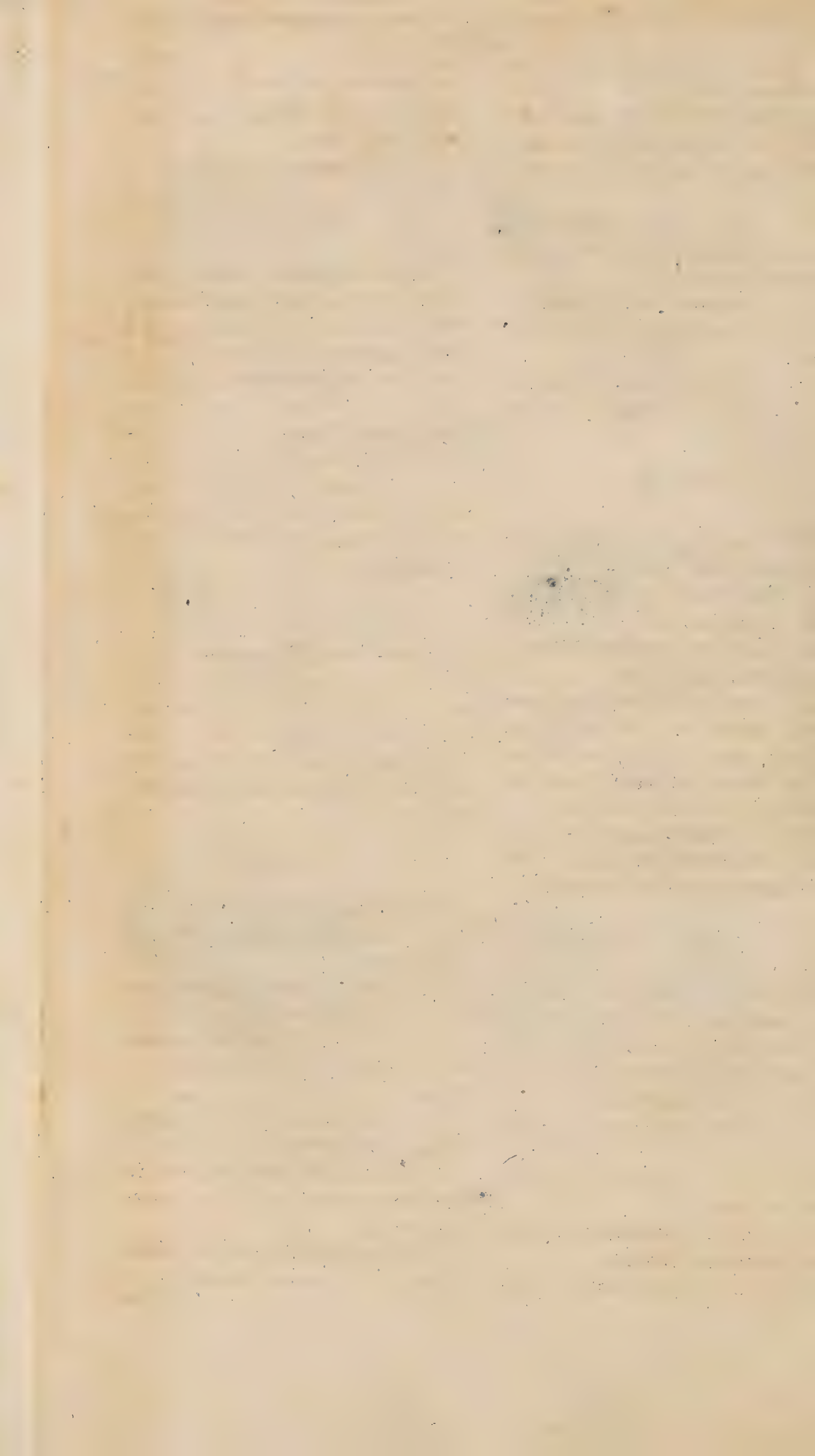


fig. 7.



fig. 5.





F, Part of the *Os Squammosum*.

G, The Mammillary Process.

H, The Trunk of the Carotid Artery.

IK, Its Trunk, which as it ascends behind the Ear, sends divers Shoots to it.

L, A Branch that is bestow'd on the Cavities of the Mastoid Process.

M, A Branch after passing on the Cartilage is dispers'd on the *Concha*.

FIG. III.

The Cartilage of the Ear and its *Meatus* laid bare.

A, The Cartilage of the Ear with its Foldings.

B, The Cartilaginous *Meatus* hanging a little down.

C, Part of the Cartilage, which makes the Orifice of the *Meatus*, and which hangs down at the Mouth of the *Concha* in the Figure of the Tongue.

DEF, Three places which are only Membranous where the Cartilages are discontinued.

FIG. IV.

Shews the Back-part of the Ear, and the Upper-part of the Cartilaginous *Meatus*, with the Ligaments which join the *Concha* to the *Os Temporum*.

AA, The Back-part of the Ear.

BB, The Back-part of the *Concha* bared.

CC, The Appendices of the Cartilaginous *Meatus*.

D, The Upper-part of the

Meatus composed only of the Glandulous Skin.

E, A Ligament of the Ear.

FIG. V.

The Glandulous Tunick that invests the Cartilaginous *Meatus*, represented three times bigger than its natural Size, that all its Parts may appear more distinct.

A, The external Part of the Glandulous Tunick.

B, The *Canalis* or *Meatus* open'd, where the small Hairs may be seen with the mouths of the Excretory Ducts of the Glands.

FIG. VI.

Part of the *Meatus* cut so as to shew the thickness of it, and the manner of the Adhesion of the Glands to that Skin; some of which Glands are taken out, to shew their *Loculi* more distinctly.

FIG. VII.

The Temple Bone bared.

A, The Squamous Part of this Bone.

BB, Part of the *Os Jugale* or *Apophysis Zygomatica*.

C, A small Depressure where the Ligament of the Ear is fasten'd.

D, The Mouth of the bony *Meatus* of the Ear.

E, The Cliffs that are seen in the Fore-part of this Bone next the *Fauces*.

F, The Membrane of the *Tympanum* in its proper Situation.

G, The Mammillary Process.

H, The Styloid Process.

I, The *Canalis* in which the internal *Carotid* passes.

K, A *Sinus* between the Bony *Meatus* and Squamous part of the *Os Temporum*, by which the Muscle of the *Malleus* passes into the *Tympanum* itself.

L, The Extremity of the Bony *Meatus*, which is part of the Channel leading from the Ear to the Palate.

FIG. VIII.

The Bony *Meatus* separated from the Temple Bone.

T A B. XX.

From M. Du Verney.

FIG. I.

THE Temple Bone after its Squamous part with the external *Meatus* is cut away, to shew the Membrane of the *Tympanum*.

A, The Membrane of the *Tympanum* in its proper place, so that it may be readily seen.

B, The Handle of the *Hammer* cleaving to the Inside of this Membrane.

C, The longest Process of the *Incus*, which may be seen through the Membrane of the *Tympanum*, tho' it is placed at some distance behind it.

D, The Head of the *Hammer* or *Malleus*.

E, The thick part of the *Incus*, with

F, Its short Process, which appears bared in this Section.

G, The Bony *Meatus* broke off in its middle.

H, The Mastoide *Apophysis*.

I, The Styloid.

K, The external Muscle of the *Malleus* in its place.

L..... The small slender and long Process of the *Malleus*, to which the Muscle is inserted.

FIG. II.

The *Membrana Tympani* taken out and view'd laterally.

FIG. III.

The Membrane of the *Tympanum* view'd after the same manner, but still remaining in the Extremity of the Bony Passage.

AA, The side of the Bony *Meatus* next the Face, by which the gradual ascending Progress of that Passage may be understood as it leads to the *Membrana Tympani*.

FIG. IV.

The lateral View of the *Incus* and *Stapes* in their proper Situation.

A, The

A, The thickest part of the *Incus*.

B, The short Branch of the *Incus*, which in this view appears on

C, The long Branch.

D, The Head of the *Stapes*, which is join'd with the long Process of the *Incus* by the mediation of the fourth Bone.

FIG. V.

N.B. That these following Figures, by mistake of the Graver, are placed in different parts of this Table, and are done four times bigger than the Life.

A, The Beak of the longest Branch of the *Incus*.

B, The *Officulum quartum*.

C, The Head of the *Stapes*, in whose Cavity (here express'd) the *Officulum quartum* is receiv'd.

FIG. VI.

The *Stapes*, four times bigger than the Life.

A, Its Head.

B, Its Neck.

CC, Its Sides.

D, Its *Basis*.

E, The Membrane of the *Stapes*.

FIG. VII.

D, The *Basis* of the *Stapes*.

FIG. VIII.

A, The *Stapes*.

B, Its Muscle, both being represented more than twice as big as the Life.

FIG. IX.

Shews the small Bones of the Ear, as they appear if you view them from that *Meatus* which opens into the *Mastoid* Process.

A, The thickest part of the *Incus*.

B, Its short Process *fore-shorten'd*, the Eye being directly against its Point.

C, Its longest Branch.

D, The back-part of the Handle of the *Malleus*.

E, The *Stapes* seen from above.

FIG. X.

Another view of the Bones of the Ear (on the opposite side) from the *Meatus*, which leads from the Palate to the *Tympanum*.

A, The Head of the *Malleus* covering the thicker part of the *Incus*, and its short Process.

B, The Handle of the *Malleus*.

C, The longer Branch of the *Incus*.

D, The *Stapes* view'd laterally.

N.B. That the Line, or rather *Stylus*, express'd in these two last Figures, shews the parts of these Bones that appear above or underneath in their different Views.

FIG. XI.

Represents almost the same parts that are express'd in Fig. I. of this Table, all being drawn much bigger than in the *Skeleton*. The Membrane of the *Tympanum* being here taken away, to shew the Bones in their proper

per Situation, and the parts that appear in the Inside of the *Tympanum* itself.

A, The *Malleus*.

B, The *Incus*.

C, The *Stapes* directly under the Eye, so that its Head is hid by the *Rostrum* of the longer Branch of the *Incus*, tho' its *Basis* may in this view somewhat appear as it covers the *Fenestra Ovalis*.

D, The bottom or lower part of the *Tympanum*, which is the Surface of the *Os Petrosum*.

E, The *Fenestra Ovalis*.

FG... Half of the *Meatus* in which the internal Muscle of the *Malleus* is inclosed.

F, That part of this divided *Meatus* that is without the *Tympanum*.

G, Its other part within the *Tympanum*.

HI, The Bony part of the *Meatus*, which leads from the Palat to the Ear, divided through its middle to shew its Cavity.

I, The Extremity of the *Meatus*, in which the *Musculus Stapedis* is inclosed.

FIG. XII.

The *Incus* view'd on that side where it is articulated to the *Malleus*.

A, The great End of the *Incus*.

B, Its short Branch Fore-shorten'd.

C, Its long Branch.

D, Its first Cavity.

E, The second

F, A Protuberance arising between these two Cavities.

FIG. XIII.

That part of the *Malleus* ^s here chiefly represented which is articulated with the *Incus*.

A, Its Head.

B, Its Handle.

C, Its large *Apophysis*.

D, Its first Protuberance, which is receiv'd in the Cavity of the *Incus* D, in the preceding Figure.

E, Its second Protuberance, which is receiv'd at E in the same Figure.

F, The Cavity which receives the Protuberance F, Fig. ib.

FIG. XIV.

The *Malleus* as it appears when view'd, from the *Aqueduct*, that the Inflection of the Muscles may be seen, especially the internal Muscles which pass into the *Tympanum* to its Insertion on the *Malleus*.

AB, The *Malleus*.

C, The exterior Muscle.

D, The interior

FIG. XV.

Shews the Circumference of the *Tympanum* and the *Malleus* view'd from the Inside, with its Muscles in its proper Situation.

A, The Head of the *Malleus*.

B, Its Handle

C, The external Muscle of the *Malleus*.

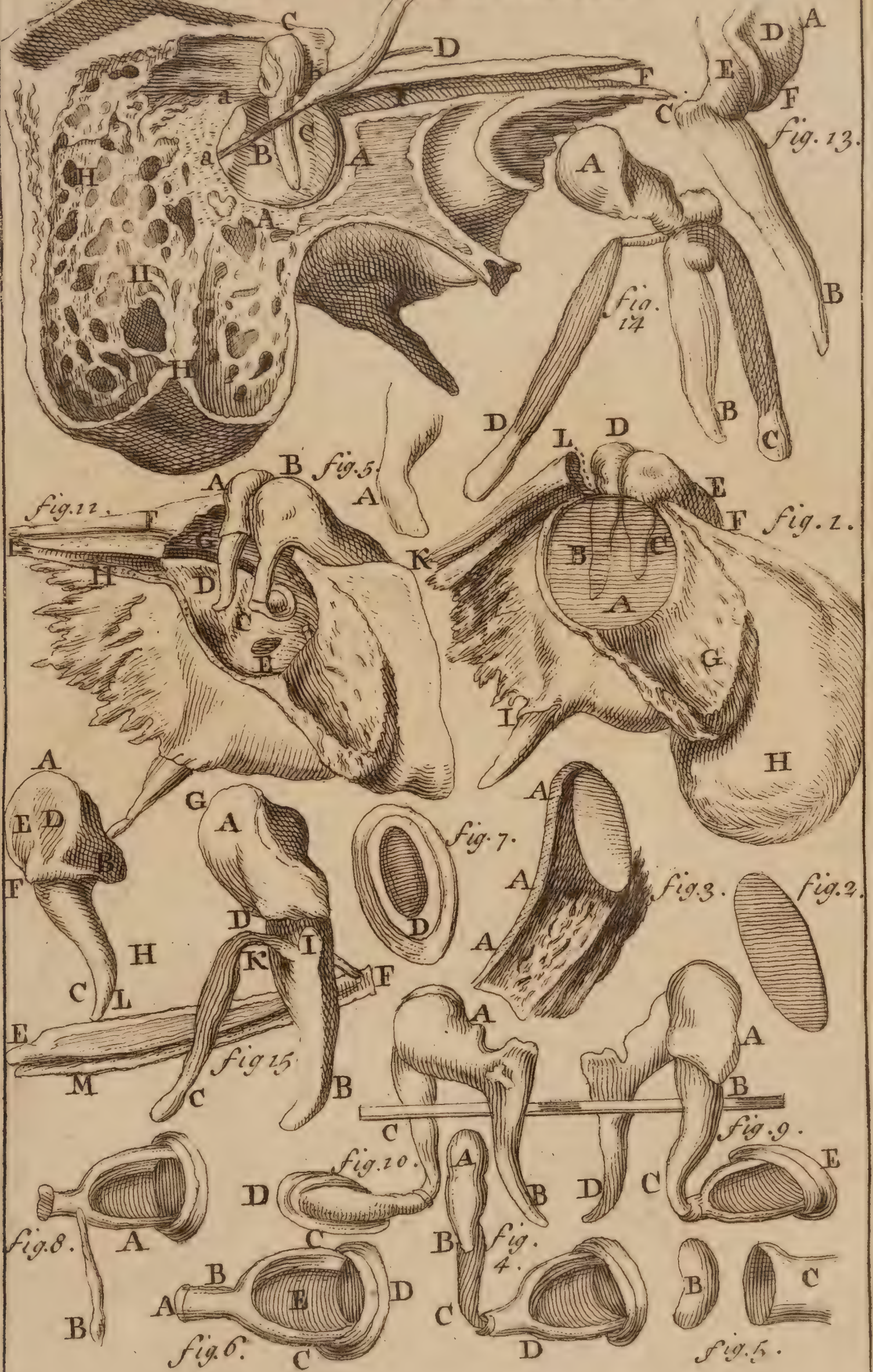
D, Its Insertion.

E, The internal Muscle of the *Malleus*.

F, The

fig. 16.

ET AB. XX.





F, The place which it goes to, and makes an obtuse Angle, and whence it is inflected to the Handle of the *Malleus*, to which it is inserted under the external Muscle.

GH, The Circumference of the *Tympanum*.

I, The great *Apophysis* of the *Malleus* fore-shorten'd.

K, The lesser *Apophysis* to which the external Muscle is inserted.

LM, The Nervous Covering of the internal Muscle, somewhat open'd to shew that Muscle.

That it may be better conceiv'd how these two Muscles move the *Malleus*, and thereby stretch the Membrane of the *Tympanum* or relax it, their Insertions do shew, that when the external Muscle CD acts only, the Extremity of the *Manubrium* B (or Handle) is drawn outward, because the Head of the *Malleus* G is fasten'd in the *Tympanum*. But if both these Muscles move together, the Extremity of the *Malleus* (being drawn inwardly by the internal Muscle EF,) stretches the *Membrana Tympani*. For the external Muscle CD draws or at least ties up the Head of the *Malleus*, which does not bear upon the *Tympanum* in H as it does in G.

FIG. XVI.

Shews the Back-part of the *Oss Temporis* as big again as the

Life, its Squamous Part being here taken away, and the Bone cut through from the top to the bottom (according to the *Stria*) so that the Incision passes through the middle of the Mastoid Process: This Section is so made, that the *Stria* about the *Membrana Tympani* appears, as does also the place where the *Stria* is wanting. Here also may be seen the *Parietes* of the Bony *Meatus* next the Face looking downwards, and covering a part of the *Membrana Tympani*; and finally all the Sinuosities of the Mastoid Process are laid open.

AA, The *Stria*.

aa, The space in which the *Stria* is wanting.

B, The side of the Bony *Meatus* next the Face, in this view lying downwards.

C, The *Malleus*.

D, The small Cord of the *Tympanum* drawn inwards, that it may be seen how it passes on the external Muscle.

b,c, A Sinuosity in the Bone on the *Stria*, which gives the Muscle the Benefit of a Pulley.

E, The external Muscle of the *Malleus* in like manner drawn inward.

FF, The Bony part of the *Meatus* that leads to the Palate.

G, The *Meatus* to the Mastoid Process.

HHH, The Sinuosities of that *Apophysis*.

T A B.

T A B. XXI.

From M. Du Verney.

FIG. I.

SHews the *Os Temporis* not exceeding its just Magnitude, and so prepared, that the *Stapes* may be seen in its proper place, together with the *Meatus* which goes from the Ear to the Palate.

A, The *Stapes* in its proper Situation.

BC, Part of the *Bony Canal*.

D, The Cartilaginous part of the same *Canal*, which is thick and large at its Extremity.

E, The Inside of the Membrane that invests the Inside of the Channel hanging down.

FIG. II.

Another View of the same Temple Bone exceeding its natural size, and so prepared that the *Cochlea* and semicircular Channels appear in their natural Situation.

A, The Arched Roof of the *Vestibulum*.

B, The *Fenestra Ovalis* as it appears when the *Stapes* and Membrane that connects it are removed.

CDE, The three semicircular Channels in their proper Sight, C the superior, D the middlemost, E the lowermost. The middlemost and lowermost in this Figure are open'd to shew their Cavities.

FIG. III.

Shews the top of the *Cochlea* taken off to its internal part, that the Semioval Spiral Channel may be seen.

FIG. IV.

Shews the *Spiral Lamina* suspended as it were in the Air, much bigger than the Life, with the Membrane which fastens it to the Superficies of the Channel.

abc, The *Lamina Spiralis*.

def, The Membrane which adheres to it.

FIG. V.

Shews the *Center* or Body of the *Cochlea*, much bigger than its natural size, in which some marks of the Turnings of the *Spiral Lamina* and the Channels may be seen.

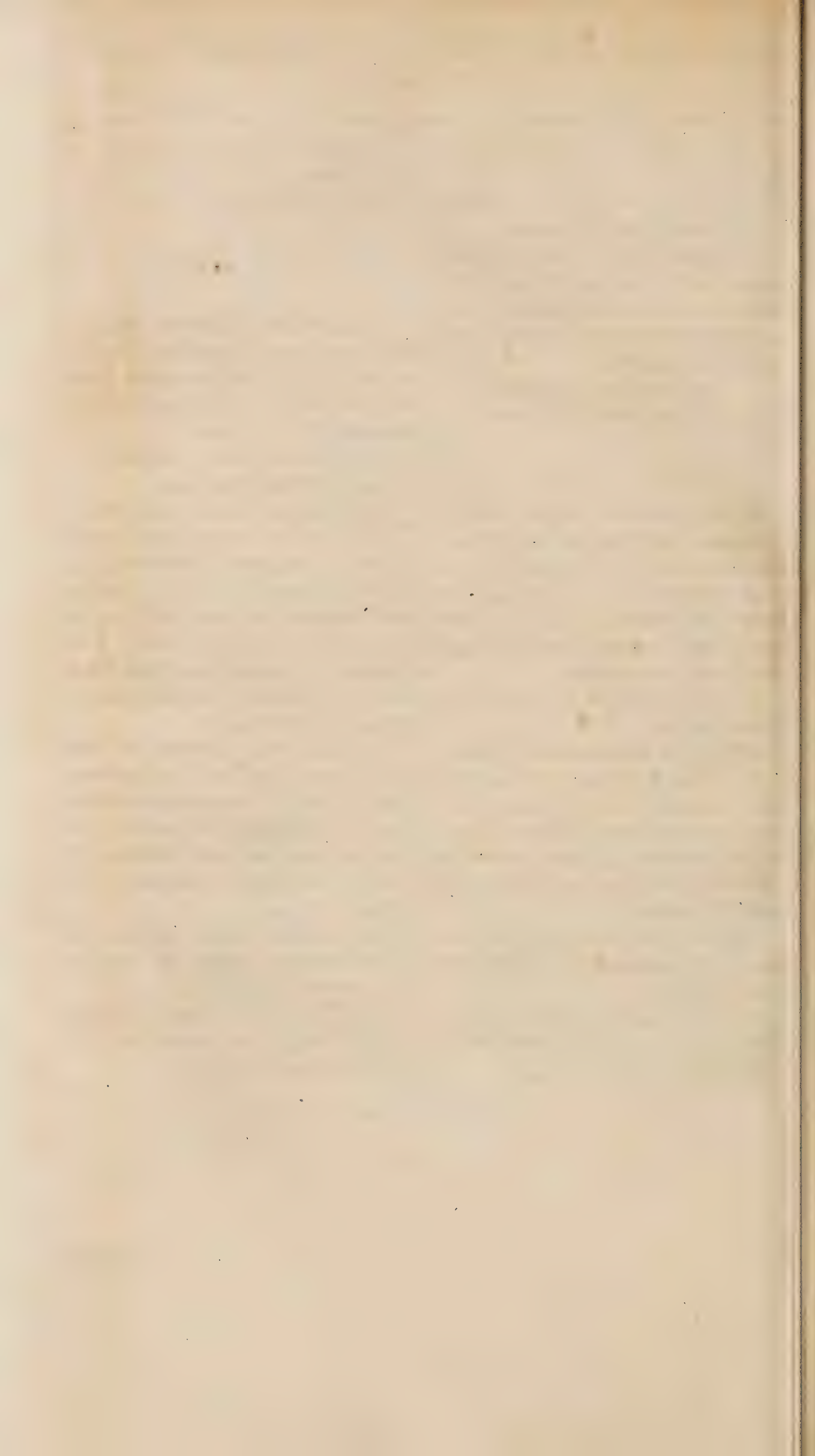
abc, The *Vestigia* of the Turnings of the *Spiral Lamina*, full of many little Holes, which afford passages of the Filaments of the *Auditory Nerve*.

def, Marks of the Extremities of the *Spiral Channel*.

FIG. VI.

Shews the *Vestibulum* and the three Semicircular Channels opened, that the distribution of





of the Vessels may be seen in them.

a, The Branch of an Artery which enters the *Vestibulum*.

b, Another Branch of the same Artery which enters by the common Hole of the *Vestibulum*, and is distributed to the superior and inferior Channels.

c, The Branch that goes to the Inside of the middle Channel.

FIG. VII.

Shews the Back-part of the *Os Petrosum* very much magnified, the Bone itself being rasped away, so much as is needful, to shew the Semicircular Convolution and Cavity in which the Auditory Nerve ends.

A, The Hole of the Auditory Nerve rasped.

BB, The Semicircular Ducts.

C, The *Basis* of the Body of the *Cochlea*, with divers small Holes in it, which afford Passages to the nervous *Fibrillæ* that are spread in all the Spiral Turnings and Windings.

D, The beginning of the *Meatus*, by which part of the hard Nerve passes.

E, The Hole by which a Branch of the soft Nerve passes, Fig. 8. E.

F, Another Hole by which a third Branch of the soft Pair passes, express'd Fig. 8. F.

FIG. VIII.

The Auditory Nerve magnified and freed from the *Os Petrosum*, that it may appear how this Nerve is divided within the *Meatus* of that Bone.

A, The Auditory Nerve divided into two Branches.

BB, Part of the soft Nerve.

CC, Part of that hard Nerve whose upper part is so express'd in this Figure, that the *Fibrillæ* and Branches of the portion of soft Nerves may be seen. The Trunk of this portion of the hard Nerve is inserted in the *Foramen* mark'd D in Fig. 7.

D, The great Branch of the soft Nerve divided into divers *Fibrillæ*, which enter into divers Holes at the *Basis* of the Body of the *Cochlea*, and are distributed into all its Spiral Turnings and Windings.

E, Another Branch of the soft Nerve, which enters by the *Foramen* mark'd E in Fig. 7.

F, The third Branch of the soft Nerve, which enters at the *Foramen* F of Fig. 7.

T A B. XXII.

From M. Du Verney.

FIG. I.

Shews the upper part of the Temple-Bone inclining a little, together with the Branch of the fifth Pair of Nerves, which is distributed into the left Cheek, and the Origin of divers of the Filaments, which is called the *Corda Tympani*, as also the Divisions of the other Branch of the same Nerve which goes to the outward part of the Ear.

A, Part of the Squammous Bone of the Temples.

B, The *Mastoid Process*.

C, The *Styloid Process*.

D, The *Zygomatick Process*.

E, The *Meatus* that goes from the Ear to the Palate.

F, A Branch of the fifth Pair, chiefly distributed into the lower Cheek, and into the Parts that join to it.

g h i k, Four Shoots from this Branch as soon as it comes out of the *Cranium*.

g, The first goes to the temporal Muscle.

h, The second to the external *Masseter*.

i, The third goes to the Muscle call'd the *Buccinator*, and Glands of the Cheeks.

k, The fourth goes to the *Musculus Pterygoideus internus*.

C, Another Shoot which is sent out from this Branch.

H, A part of this Branch,

which is joined with the hard Branch of the Auditory Nerve.

I, The distribution of the Branch G into the outward part of the Ear, whose outward Branches are cut off.

K, A Branch, which being cut off, goes into the lower Jaw.

LL, A Branch which goes to the side of the Tongue.

MM, A Branch going from thence, and ascending backward over the Bony part of the *Meatus* of the Aquæduct, and goes into the *Tympanum*, and is that which is commonly call'd the *Corda Tympani*.

N, The external Muscle of the *Malleus* in its proper place.

FIG. II.

A, The *Processus Mastoideus*.

B, The hinder part of the Ear seen.

C, The Trunk of the second vertebral Pair.

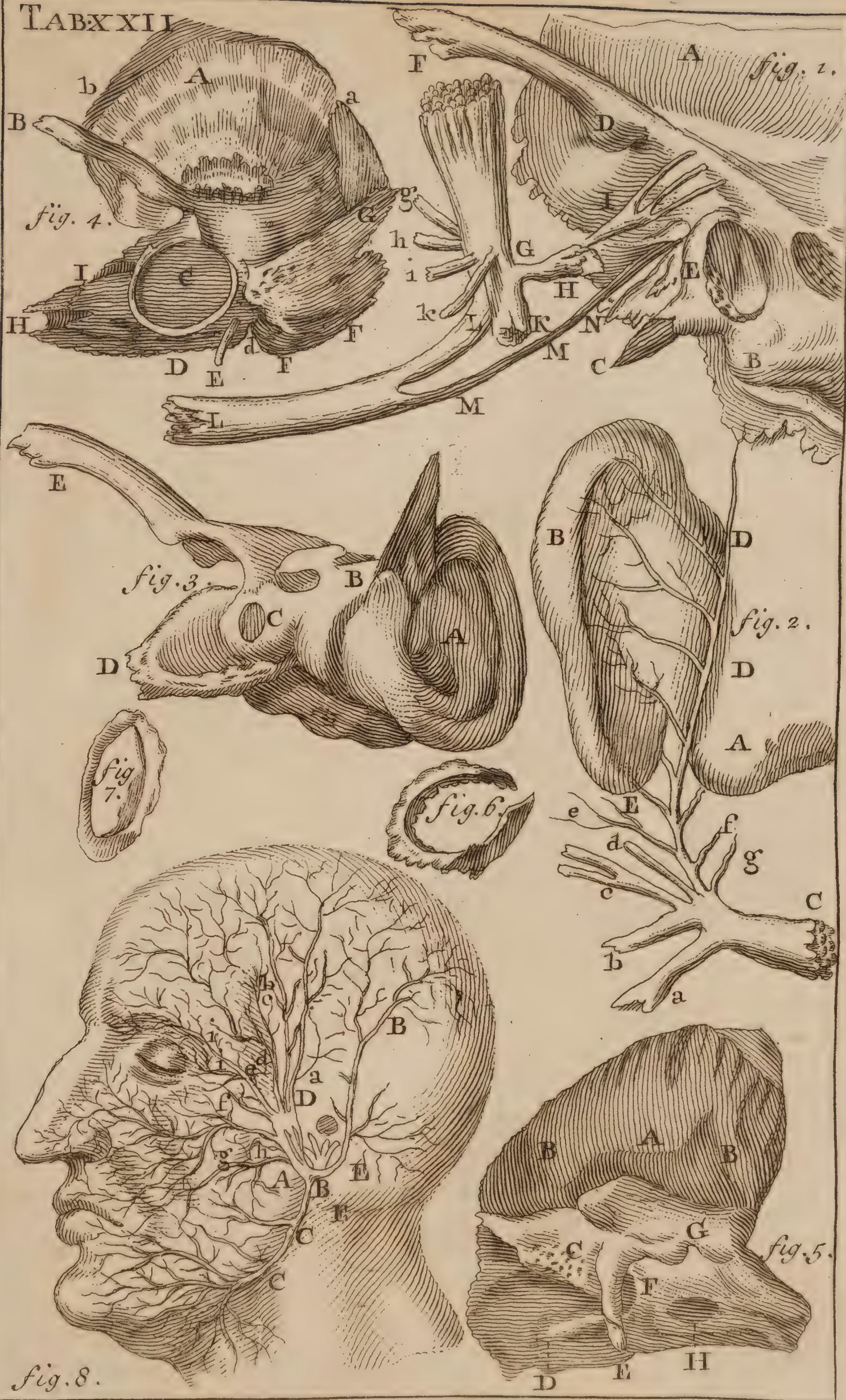
abcdefg, Many Branches cut off, which the last mention'd Trunk sends to the neighbouring Muscles and vertebral Nerves.

DD, A Branch of the same Nerve, which passes by the Back-part of the Ear.

E, A Branch which ends in the *Auricula*, and in the *Cartilaginous Meatus*.

FIG.

TABX XII



F I G. III.

Shews the Ear of a Child of a Year old.

A, The under part of the Ear.

BB, Its Channel or Cartilaginous *Meatus*.

C, The Membrane that joins the Cartilaginous *Meatus* to the Bony *Annulus*, which in time grows hard, and chiefly makes up the Bony *Meatus* of the Ear.

D, The Bony *Annulus*.

E, The Process of the *Os Jugale*.

F I G. IV.

Shews the Fore-part of the temporal Bone of an *Embryo*.

A, Its Squamous part, whose little Bony Fibres appear, as it is seen in some other Bones in the Skull of an *Embryo*.

ab, The Margin of its Circumference, as yet Cartilaginous.

B, Part of the *Os Jugale*.

C, The Membrane of the *Tympanum*.

D, The Bony *Annulus* with which the Membrane of the *Tympanum* is join'd.

E, The *Processus Styloides*, as yet Cartilaginous.

FF, The *Processus Mastoides* very small.

d, The *Foramen*, through which the hard Branch of the Auditory Nerve passes out.

G, The Conjunction of the Squamous Part of the Temple Bone with the Mastoid Bone, united in an Adult.

H, The Channel in which that Carotid Artery passes.

I, The *Foramen* that goes from the Palate to the Mouth.

F I G. V.

Shews the hinder-part of the Temple Bone.

A, The Squamous part.

BB, The place where it is separated from the rest of the *Os Petrosum*.

C, The superior semicircular Channel unprepared.

D, The inferior —

E, The place where both Channels meet.

F, A remarkable Hollow which lies under the superior Channel, and which in time is filled up, and is not perceivable.

G, The *Foramen* for the passing of the hard Nerve.

H, The *Foramen* of the Auditory Nerve.

F I G. VI.

Shews the Bony *Annulus* a little sloping, that the *Striae* may be seen.

F I G. VII.

Shews the same *Annulus*, but otherwise inclin'd, that the rest of the *Striae* may be visible.

F I G. VIII.

This shews the hard Portion of the Auditory Nerve on different parts of the Face.

A, The Trunk of the hard part of the Auditory Nerve coming out of the *Cranium* through the *Foramen* that is between the *Processus Mastoides* and *Styloides*.

BB, A

BB, A great Branch which is sent from that Trunk to the Ear, whose small Filaments are seen cut off.

CC, The inferior Branch which is dispersed to the Chin, Muscles, and Teguments, that lie under the lower Jaw.

a, The superior Branch that is divided in a three-fold manner.

D b c d e, Five Branches of this Division sent into the Muscles of the Temples, Forehead, and Eye-lids.

f, A Branch of this Division which goes into the middle of the Cheek, through the Branch of the fifth Pair (mark'd g) and becomes bigger.

h, The last Branch of this Division, that sends Filaments to the *Musculus Buccinator* and Muscles of the Lips.

i i, Two small Filaments which seem cut off, because they pass into the *Orbita* of the Eye through their proper *Foramina*, which are in the first Bone of the upper Jaw.

T A B. XXIII.

FIG. I, II, V, VI, VII, & VIII, from Vellingius. The III^d from Schneider. FIG. IV, from Calerius. The rest from Malpighius.

FIG. I.

A, **T**HE Hairy Scalp separated.

BB, The *Panniculus Carnosus*, by some call'd *Pericranium*, also separated.

C, The *Periostium*, by some not distinguish'd from the *Pericranium*, here separated.

DD, The Skull bared.

E, The *Musculus Frontis*.

FF, The *Orbicularis*, or *Claufor Palpebrarum*.

G, The first Muscle of the *Ala Nasi*, call'd *Pyramidalis*.

H, The *Musc. Dilatator Ala Nasi*.

I, A fictitious Muscle call'd by Authors *Musc. Dilatans Alas*, or *Circularis Nasi*.

K, *Musc. Attollens Labiorum*.

L, *Zygomaticus*.

M, *Depressor Labiorum Com-
munis*.

N, *Constrictor Labiorum*.

O, *Buccinator*.

PP, *Temporalis*.

Q, *Attollens Auriculam*.

R, *Retrahens Auriculam*.

S, *Masseter*.

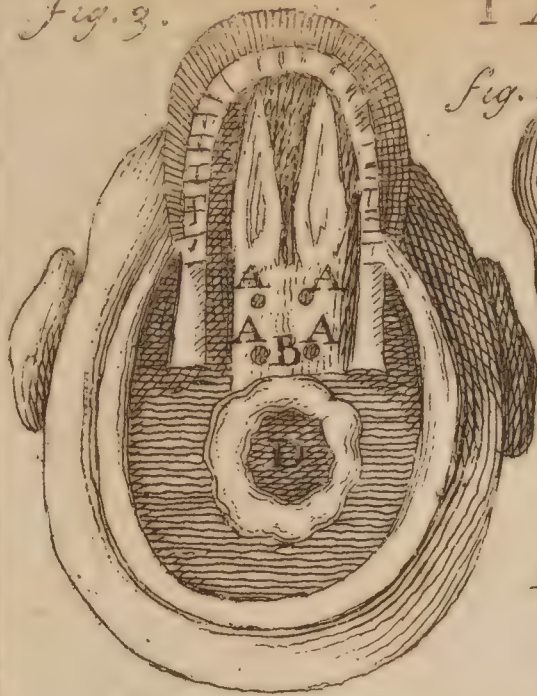
T, *Digastricus* cut from its Original.

FIG. II.

AA, The Temporal Muscles freed from their Originals, and left at their Insertions a a, at the *Processus Coronæ* of the lower Jaw.

BB, The

Fig. 3.



TAB. XXIII.

Fig. 1.



Fig. 17.



Fig. 12.

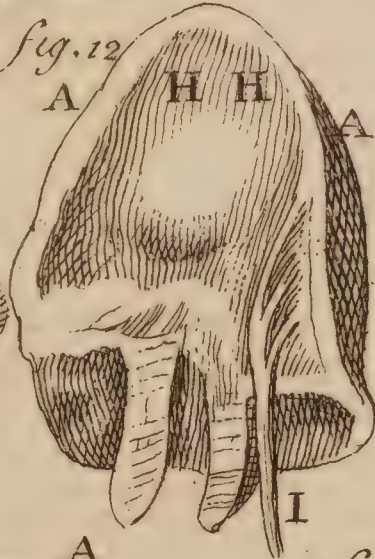


Fig. 16.

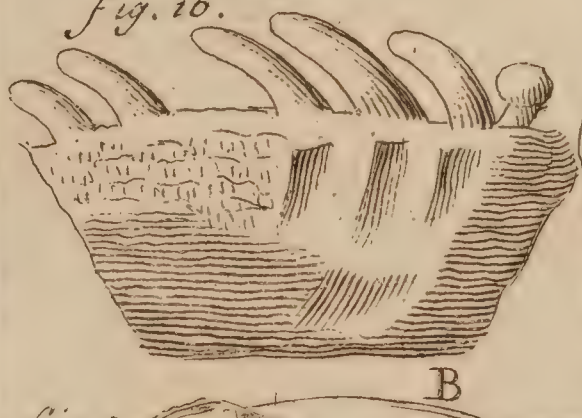


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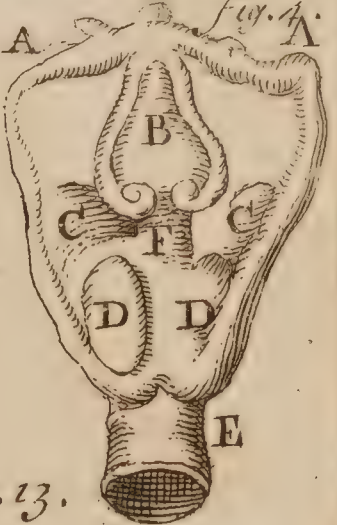


Fig. 8.



Fig. 13.



Fig. 9.



Fig. 2.

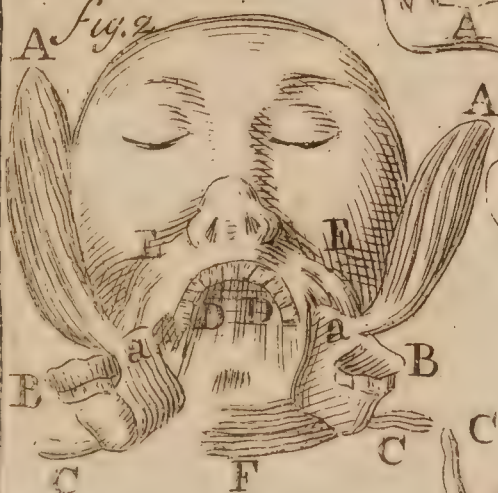


Fig. 14.



Fig. 10.

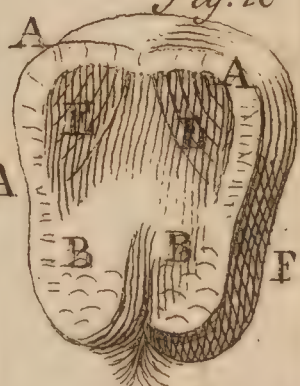


Fig. 6.



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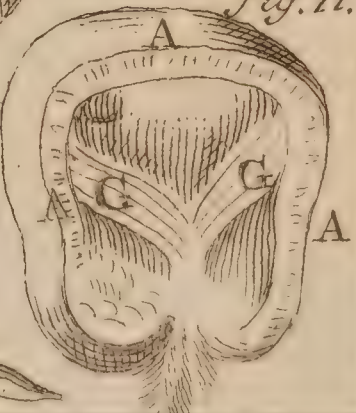


Fig. 7.

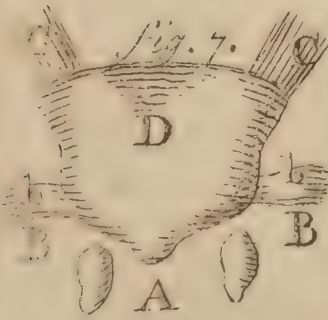
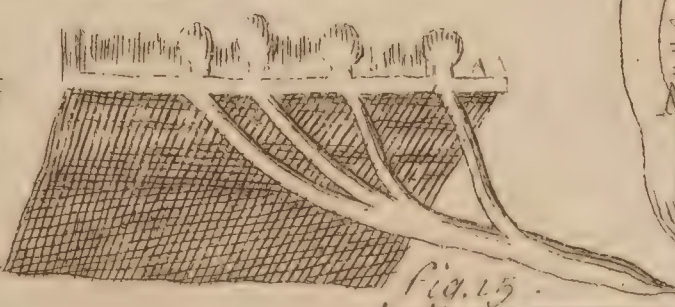


Fig. 15.



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BB, The *Musculi Masseteres* separated.

CC, Parts of the *Digastrick* Muscles left at their Insertions to the lower Jaw.

D, The *Musculus Prerarygoideus internus* on both sides.

EE, The *Plerygoideus internus* on both sides.

F, Part of the *Quadratus* separated.

FIG. III.

That part of this Figure marked AAAA and B, is by no means intelligible either in this Copy, or in the Original of *Schneider*; C the Membrane as it invests the Roof of the Mouth; D the *Foramen* of the *Os Occipitis*, by which the Spinal Marrow descends.

FIG. IV.

The back-part of the *Larynx*, with its Muscles, &c.

AA, The *Os Hyoides*.

B, The Concave part of the *Epiglottis*.

CC, The hinder Concave part of the *Cartilago Thyroides*.

DD, The *Par Cricocarytenoides posticum*.

E, The Posterior Membranous part of the Wind-pipe.

F, The *Musculus Arytenoides*.

FIG. V. and VI.

A, That part of the *Os Hyoides* call'd its *Basis*, Fig. 5. A Fig. 6. shews the internal concave part of its *Basis*.

BB, The Horns of the *Os Hyoides*.

CC, The Cartilaginous Appendages.

FIG. VII.

The *Uvula* with the *Amigdalæ* or *Tonsillæ*.

A, The *Gargareon* or *Uvula*.

bb, The external Pair of Muscles call'd *Perygostaphilinus*.

CC, The internal Pair call'd *Sphenostaphilinus*.

D, That part of the Palate from which the *Uvula* is continued.

BB, The *Tonsillæ*.

FIG. VIII.

1, 2, 3, 4, 5. The Tongue of a Quadruped divided into five parts.

A, Its *Apex* or Point.

B, Its middle.

C, Its *Basis*.

FIG. IX, X, XI, XII, XIII.

Portions of the divided Tongue, in which are shewn the strait course of its external Fibres, and the various Dispositions of its internal Fibres.

9, The top of the Tongue cut off transversely.

AA, The carnosus Fibres which pass according to the length of the Tongue, and inclose it on every side, by which the Tongue is drawn into the Mouth.

B, The fleshy Fibres that pass transversely, and serve to narrow the Tongue.

d

C, The

C, The Perpendicular Fibres which lessen it in its thickness.

D, The Membrane as yet covering the Tongue.

E, The carnous Fibres passing obliquely from the sides to the upper Surface of the Tongue.

F, The strait Fibres which are continued with the Muscles of the Tongue.

G, The Angular Fibres (according to *Malpighius*) which draw the Tongue inwards.

HH, The Fibres which depress the ridge of the Back.

I, A Branch of a Nerve, which ends in the *Papilla* of the Tongue.

LL, The streight Fibres, which compress the *Basis* of the Tongue, between which are some small Glands and Fat.

M, The *Basis* of the Tongue.

N, The lower side of the Tongue in this Section.

FIG. XIV.

The *Basis* of the Tongue cut traverse.

FIG. XV.

A piece of the Tongue with a Branch of a Nerve, and three sorts of *Papilla*.

FIG. XVI.

The Horny *Papilla* with their two coverings.

FIG. XVII.

AA, One of the *Tonsilla*, commonly call'd the Almonds of the Ears.

BB, The two larger Sinusses of the *Tonsilla*.

CCC, The several little Orifices of Sinusses that open into the larger.

T A B. XXIV.

FIG. I. from *Blasius*; II. and V. from *Steno*; III. and IV. from *Dr. Wharton*; VI. and VII. from *Lewenhoeck*; VIII. and IX. from *Caspar Bartholine*.

FIG. I.

A, THE Parotid Gland in its natural Situation.

B, Its Salival Duct which passes through the *Musculus Buccinator* into the Month.

C, A Probe in the Salival Duct.

FIG. II.

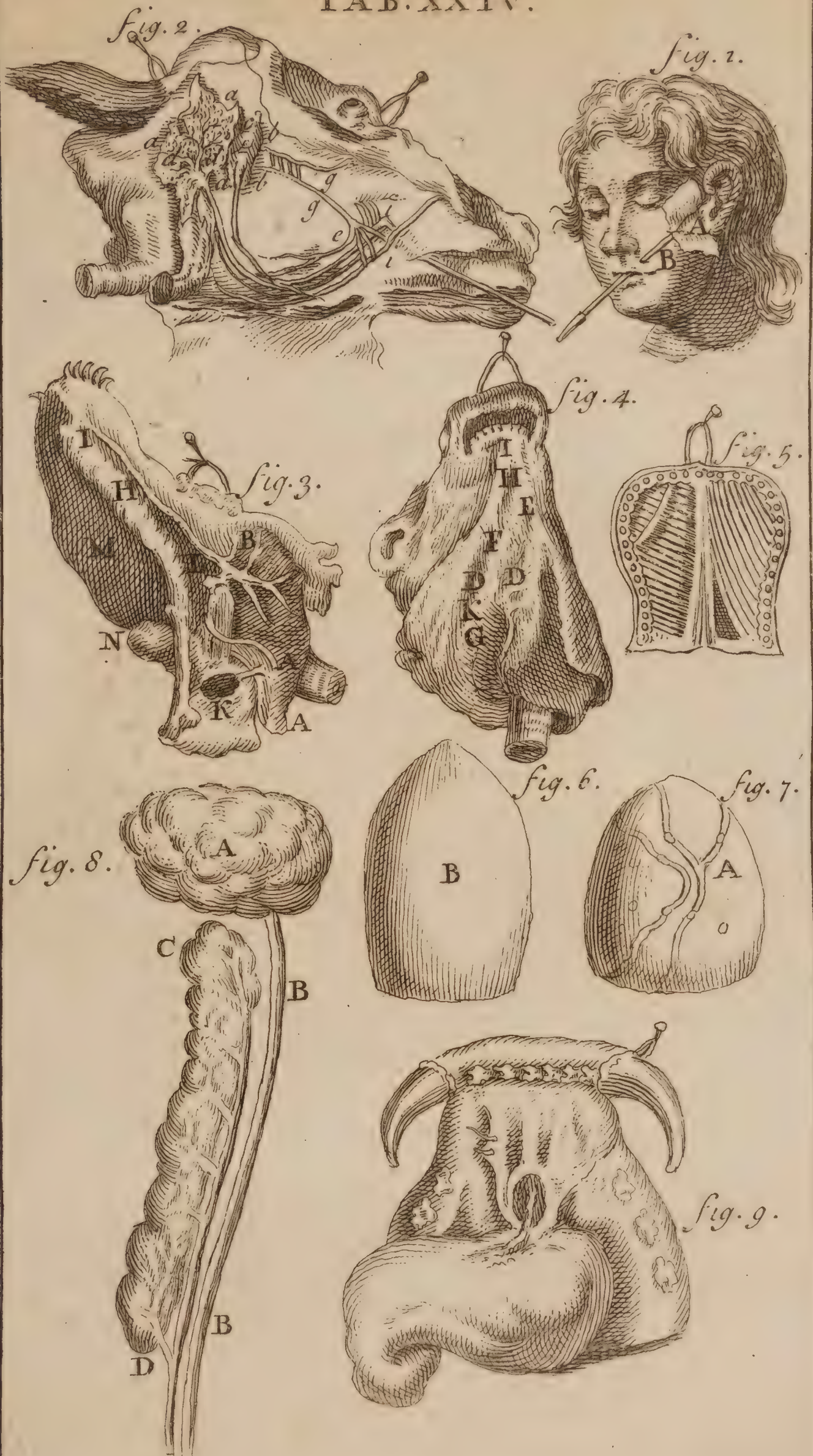
The Salival Ducts of a Calf.

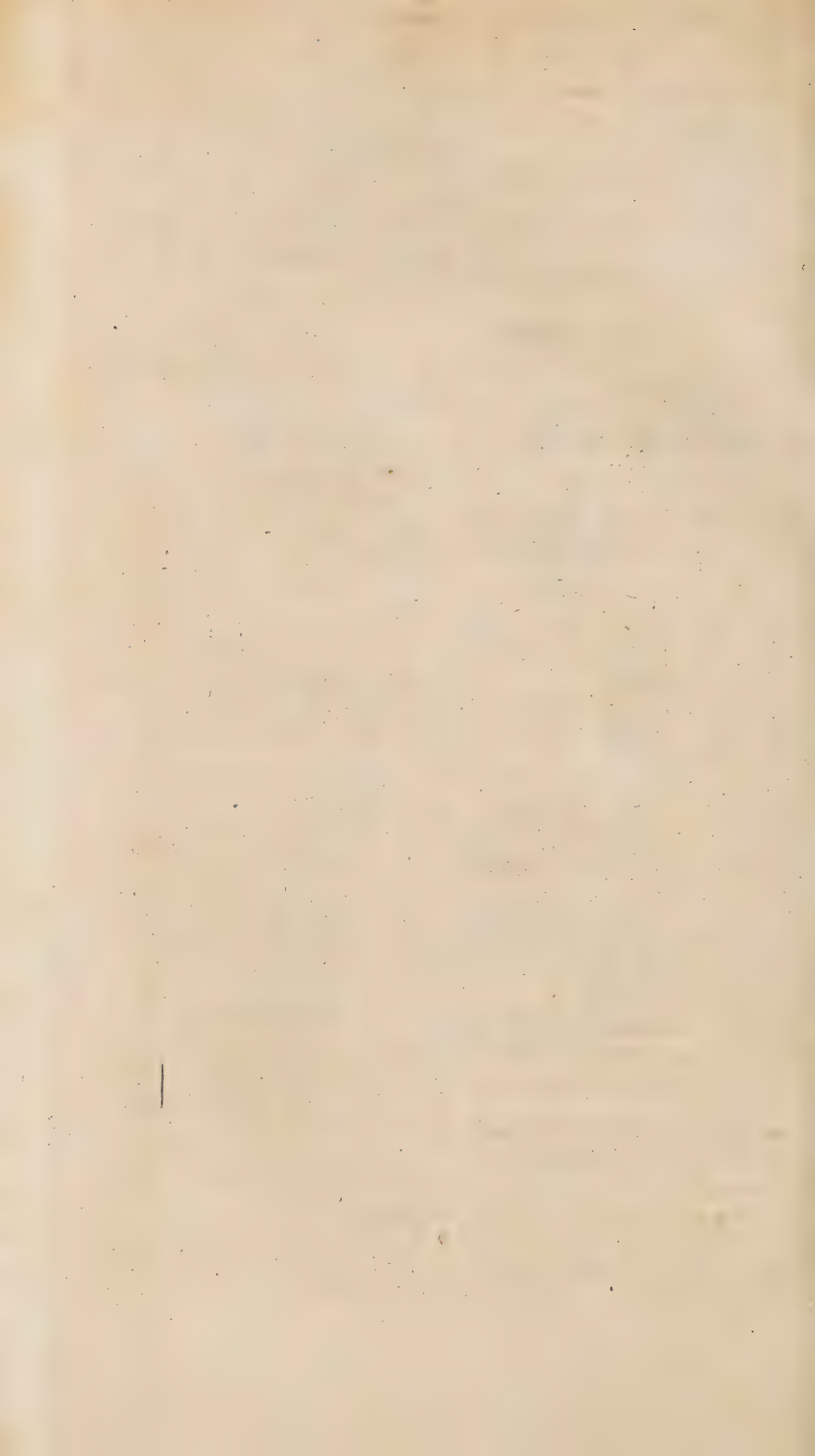
a a a, The conglomerated Gland call'd *Parotis*.

bb, The Parotid *conglobate* Gland.

cc, The Lymphæducts tending downwards between the Parotid

TAB. XXIV.





Parotid *Conglobate* and *Conglomerate* Glands.

dd, The Roots of the Salival Excretory Ducts.

e, The Trunk of the *Ductus Salivalis*.

f, The outward Branch of the *Jugular Veins*.

gg, The Nerves communicating as well without as within the Gland and Head.

ii, The Nervous Twigs accompanying the Salival Duct.

FIG. III. and IV.

Shews the *inferior Maxillary* Gland, with its *Salival* Ducts in a Calf's Head.

A, The back-part of the *inferior maxillary* Salival Gland.

aaaa, The posterior Roots of the *Ductus Salivalis*.

B, The Fore-part of the Gland.

bb, The anterior Roots of the same Ducts.

C, The Trunk of the Salival Ducts arising from the hinder Roots of the Salival Ducts aa, and marching over the *Tendon* of the *Digastrick* Muscle.

D, The other part of the *Salival* Duct on the other side of the *Tendon* where it joins with the foremost Roots bb.

E, The Union of all these Ducts into one common Trunk.

FG, The *Musculus Digastricus* or *Biventer*.

H, The Progress of the Salival Duct towards the Fore-teeth of the lower Jaw.

I, The opening of the *Ductus Salivalis* under the Tip of the Tongue near the *Dentes Incisores* of the lower Jaw.

K, A round Glandule placed by the Jaw.

L, The row of *Asperities* under the side of the Tongue.

M, The Tongue laid aside to shew the endings of the Salival Duct at I.

N, The *Tonsilla*.

FIG. V.

The Musculous Texture of the Tongue.

FIG. VI. and VII.

AB, Two Scales taken from the internal Tunick of the Mouth, when view'd with a Microscope. A certain Streak in them which contain little Globules.

FIG. VIII.

The Salival Gland of the lower Jaw of a Lioness.

A, The Gland of the lower Jaw.

B, Its *Salival* Duct, discover'd by Dr. *Wharton*.

C, The *Glandula Sublingualis*.

D, Its *Salival* Duct, first discover'd by *Cas. Bartholine*; the various Ramifications of which appear dispersed through the whole Gland.

FIG. IX.

Shews the two Mouths of the inferior Salival Ducts on both sides, viz. that of Dr. *Wharton* and of *C. Bartholine*.

aa, Two Bristles or Wires inserted into the Mouths of those Ducts on both sides.

b, The Tongue turn'd aside to shew the Orifices of the Ducts and the lower Jaw C.

TAB. XXV.

From Bidloo.

FIG. I.

IS a Fictitious Figure of the Muscles of the *Fauces* and *Oesophagus*.

FIG. II.

Shews the Stomach revers'd in this Print.

AA, The *Fundus* of the Stomach.

B, The lower part of the *Gula* or *Oesophagus*.

C, The *Pylorus* or right Orifice, here represented the left.

D, The *Omentum* hanging down which lies on the Guts.

N.B. In this Figure the superior and inferior *Coronary* Blood-Vessels of the *Stomach* are very well express'd; the lower parting with Slips to the *Omentum* as well as to the *Stomach*.

FIG. III.

The Texture of the *Peritoneum* examined by a Microscope.

AA, The *Nervous* and *Tenacious* Fibres, which pass accord-

ing to the length of the *Abdomen*.

BB, Other Fibres carried in a circular manner from the *Nervous Plexus* through the breadth of the *Abdomen*.

CC, The *Fibrillæ* which join the preceding Fibres together, are complicated with them.

DD, Parts of the Blood-Vessels broke off.

FIG. IV.

The Process of the *Peritoneum* on the *Spermatick Vessels*.

AA, Part of the *Peritoneum*.

B, The Orifice or *Annulus* of its Process.

CC, The Blood-Vessels which pass to the *Testicles*, on which the internal *Lamina* of the *Peritoneum* is continued in half their Progress between the *Inguina* and *Scrotum*, and is by some call'd *Diverticulum*, while the external *Lamina* of the *Peritoneum* is not only continued on those *Spermatick Vessels*, but provides a Covering also for the *Testicle* itself, which is called *Tunica Vaginalis*.

fig. 2.

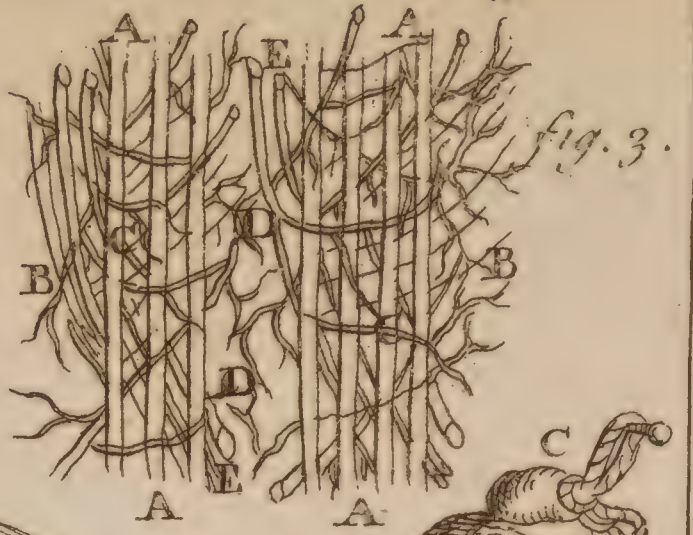


fig. 3.

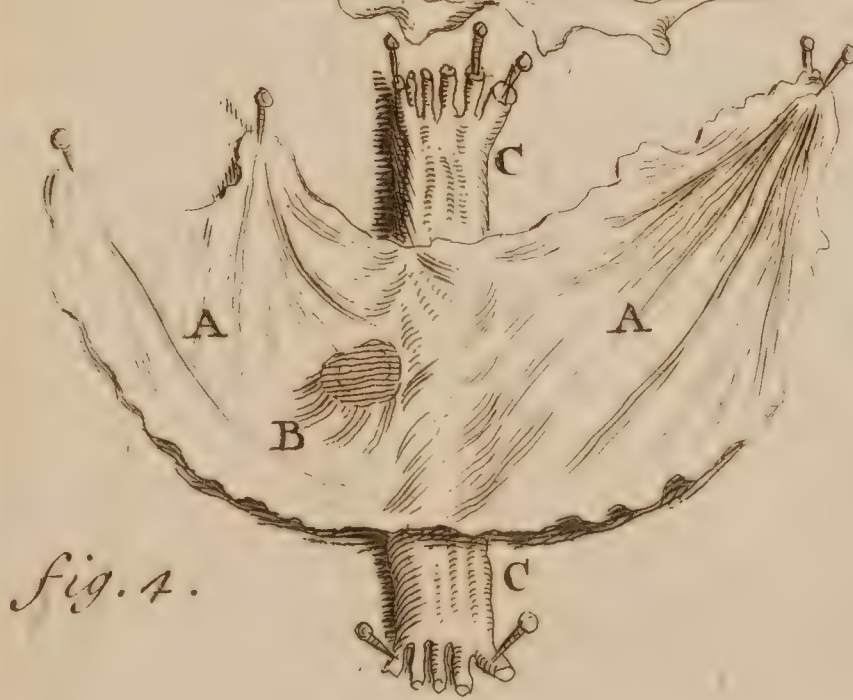


fig. 4.



fig. 1.

T A B. XXVI.

FIG. I, II, and IV, from Dr. Willis, the III^d. from Bidloo.

FIG. I.

THE Stomach taken out and blow'd up, with its Blood-Vessels so distended, that the great Trunks and Branches of its Veins and Arteries appear.

C, The Oesophagus.

GE, The Mouth of the Stomach, or left Orifice.

AD, The Right Orifice call'd the Pylorus, with the Duodenum continued to it, R.

Note, That A is by mistake also placed on the Fundus of the Stomach of this Figure, as is FF.

B, The lower part of the Stomach.

Q, The Valve at the Pylorus.

R, A cluster of Glands in the Duodenum.

FIG. II.

This is patch'd together from Dr. Willis, but so very ill composed, that no Explication can afford any tolerable Idea of what

it pretends to represent, wherefore it shall be pass'd by.

FIG. III.

S, The right Orifice of the Stomach.

T, The left Orifice when cut off, after the Stomach was blown up and dry'd.

FIG. IV.

N, A Portion of the internal Membrane of the Stomach; in which, its internal Concave Surface is exhibited, to shew the Foldings of that Membrane cover'd with its Villi.

O, A piece of the Downy or Glandulous Coat, in which its outward Superficies (that cleaves to the Nervous or Vascular Coat) appears very full of Glandules, and the Mouths of Vessels.

P, A piece of the Nervous Coat, in which, the downy Crust being removed, its inner or concave Superficies appears with thick Branchings of Blood-Vessels.

T A B. XXVII.

FIG. I. & II. according to Dr. Willis, the Vth from Peyers, the rest from Swammerdam and Bartholin.

FIG. I.

A, **T**HE external Membrane of one of the small Guts, which is borrow'd from the *Péritoneum*, and being very thin, the Longitudinal Fibres (which are placed immediately under it) do somewhat appear through it.

B, The Longitudinal Fibres of the Gut, cleared of the external Membrane.

C, The Circular Fibres which appear immediately under the Longitudinal: these two Orders of Fibres are accounted the second Tunick of the Intestine by Dr. Willis.

FIG. II.

B, The internal Concave Surface of the Nervous or Vascular Tunick, raised from the Villous Tunick, to shew its Vessels.

A, The external convex'd Surface of the Villous Tunick made bare, to shew its Glands and Mouths of its small Blood-Vessels.

FIG. III.

A, The external Surface of the Gut.

BBB, The Villous Tubes of the internal Surface of the Gut, in whose edges the small Channels appear.

FIG. IV.

Part of the *Intestinum Jejunum* dry'd and cut open.

A, Part of the Gut, call'd *Jejunum*.

B, Its Inside.

CC, Part of it divided and hanging down, to shew its Inside.

aaa, The *Valvulae Conniventes*.

bbb, The external Marks of the *Connivent* Valves on the Surface of the Gut.

FIG. V.

A, The lower end of the *Ileum* cut open and expanded, to shew its Inside.

B, The large Glandulous *Plexus* at the Extremity of the *Ileum*.

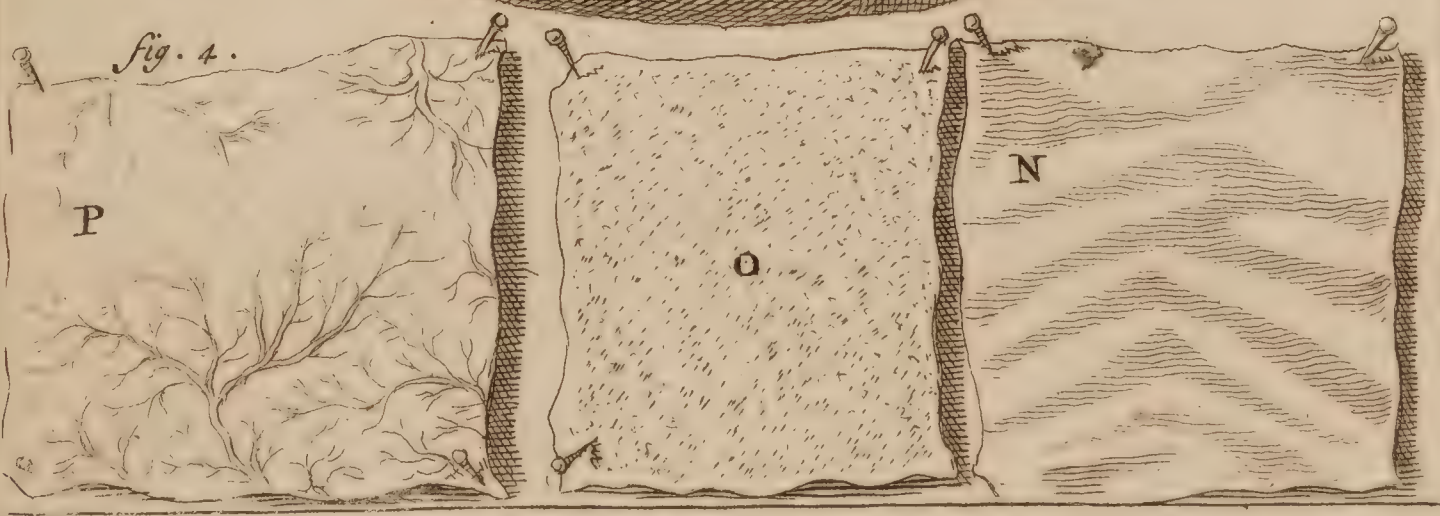
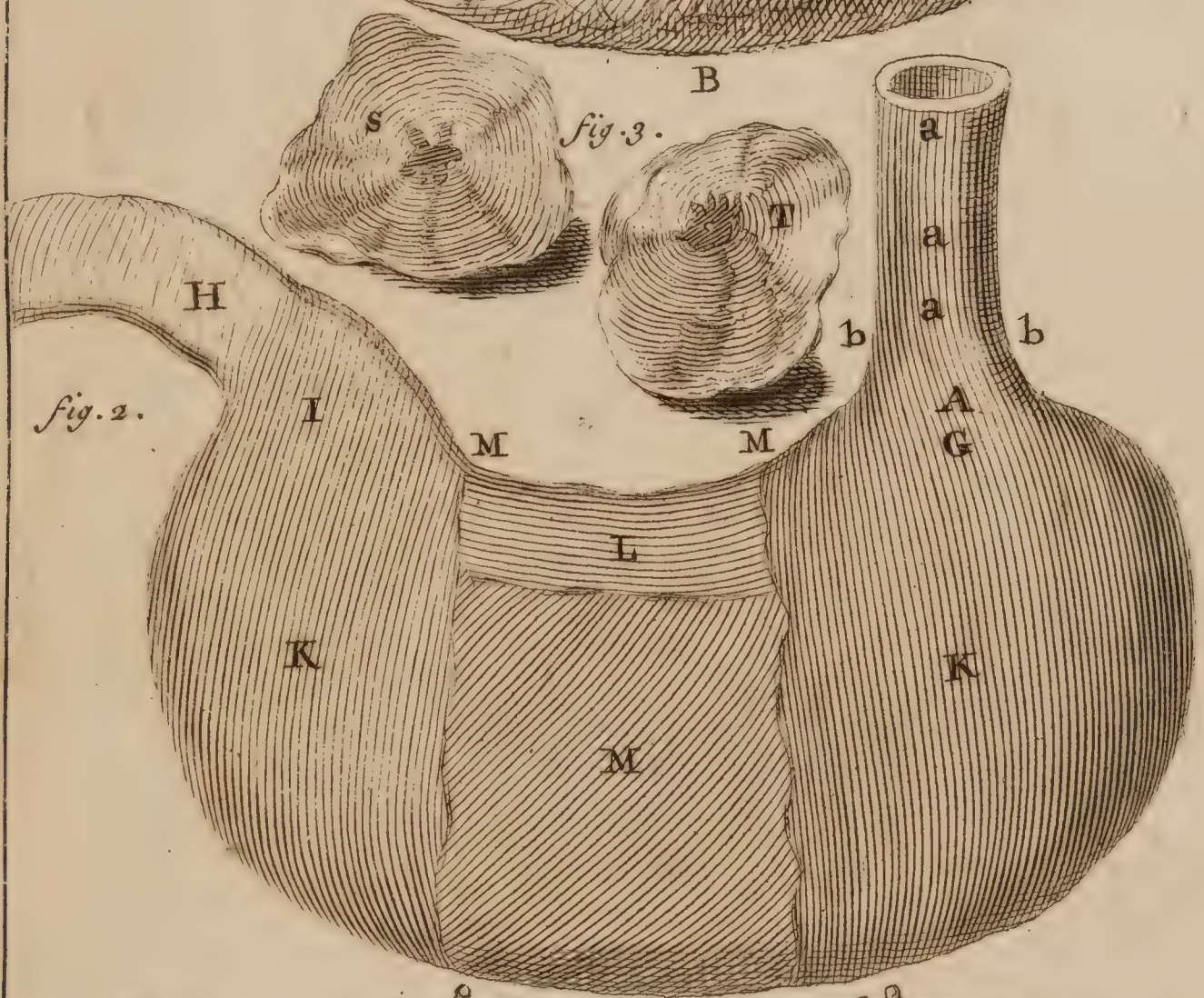
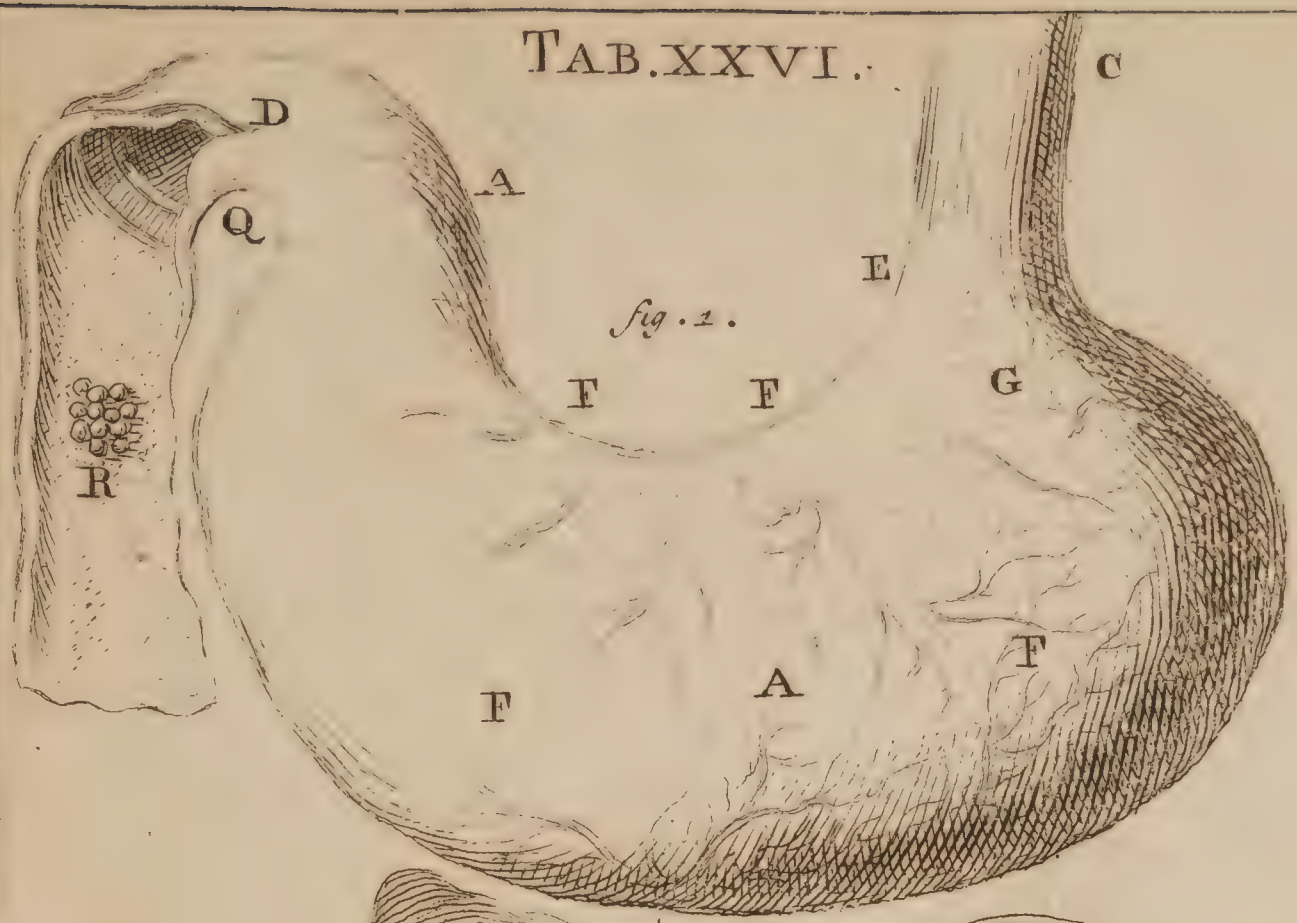
CC, The Valve of *Bauhinus* divided, in whose *Limbus* the *Solitary* Glands appear.

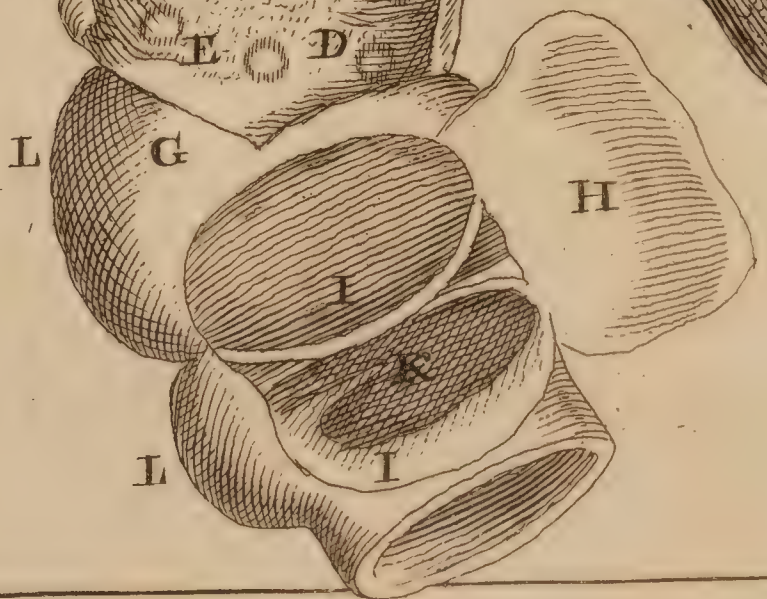
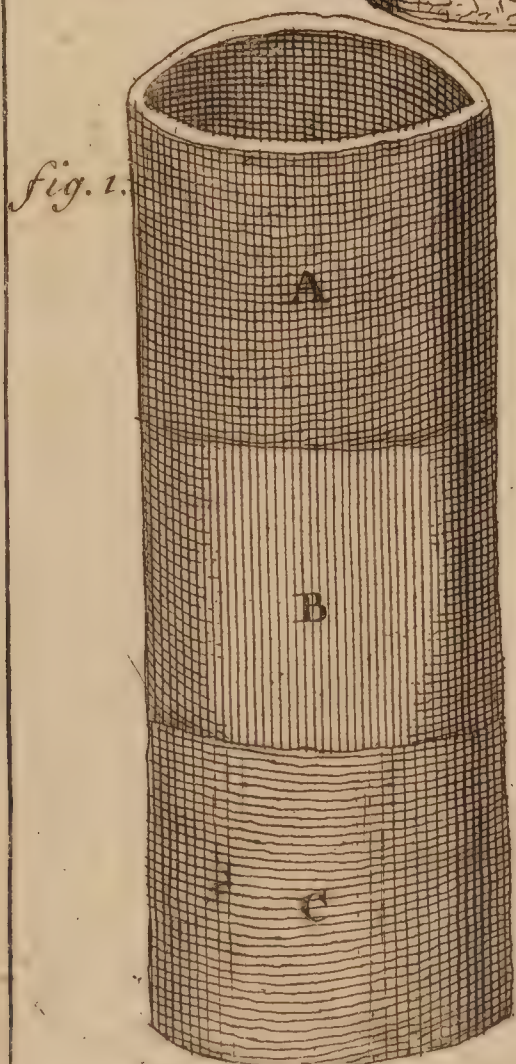
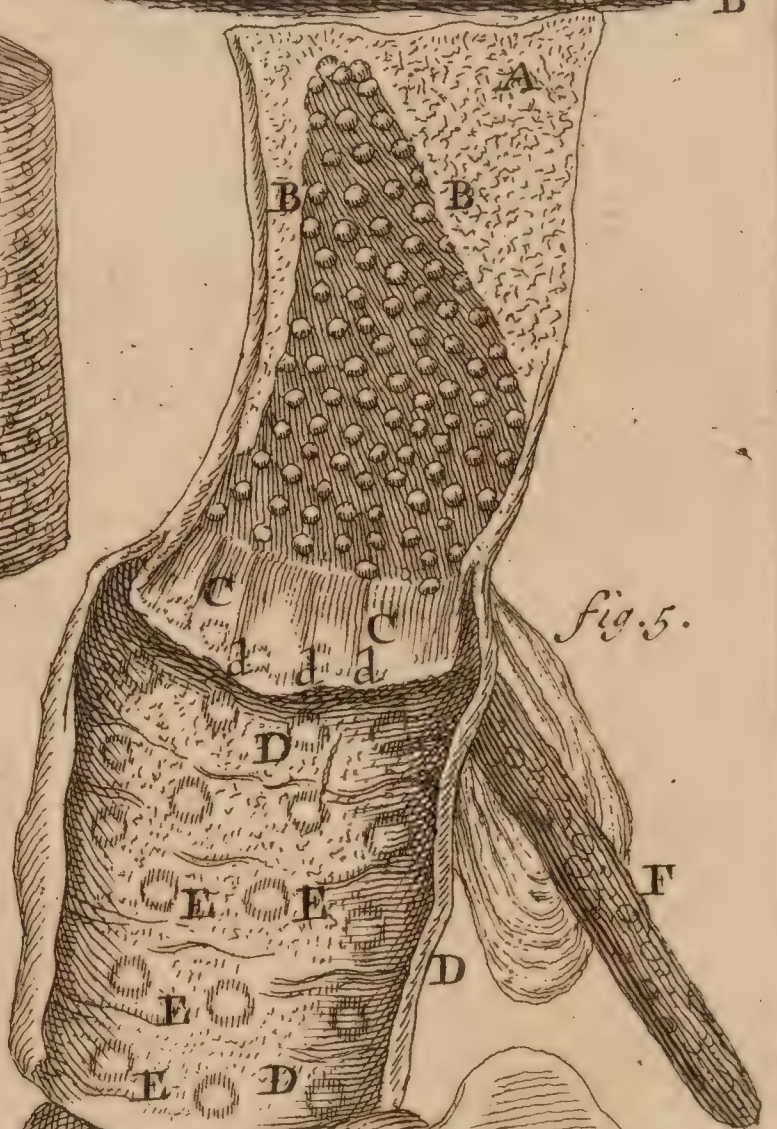
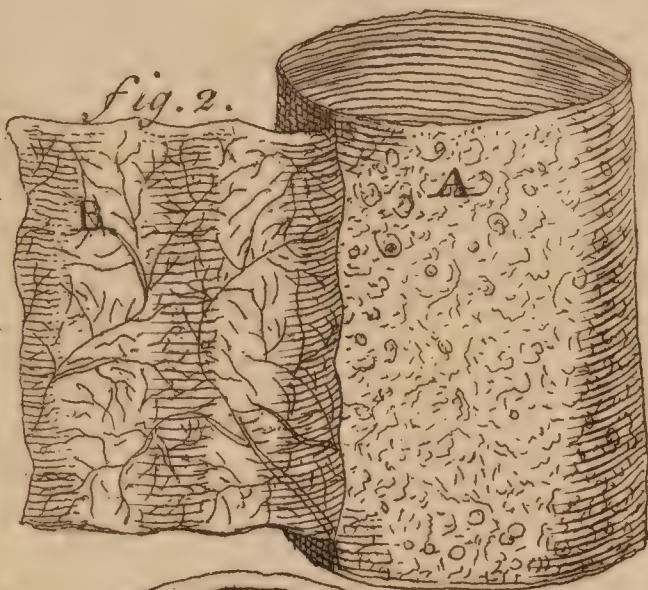
DD, A Portion of the *Colon* divided also according to its length and spread open, to shew its Glandules also.

EE, The Lenticular *Solitary* Glands, dispersed through the inward Tunick of the *Colon*.

F, The

TAB. XXVI.





F, The *Pseudocacum* or Vermiform Process, commonly taken for the *Cacum*, here express'd with its Inside outmost, to shew its Lenticular Glands.

G, The Outside of the Colon.

H, Part of the Colon raised to shew its Inside.

II, The Connivent Valves.

K, The space between the Connivent Valves open'd.

LL, The Cells made by the external Ligament of the Colon, on dividing which Ligament, this Gut loses those Prominencies, its sides becoming streight.

M, The *Intestinum Cacum* of the Antients, call'd by some *Sacculus Stercoraceus*.

T A B. XXVIII.

F I G. I.

D One after the Guts and Mesentery, and some *Quadrupeds*, shews the *Mesentery* and its Vessels, with the *Chyliferous Receptacle* and *Thoracick Duct*.

A, The *Ventricle* out of its proper Situation.

CCC, The *Mesentery* connected to the *Jejunum*.

EE, The greater and lesser Glands of the *Mesentery*, whereof the greatest is call'd the *Pancreas Asellii*.

FFF, The *Lacteal* Vessels with their Valves.

G, The Trunk of the *Mesenterick Artery*.

HH, The Trunk of the *Mesenterick Vein*.

III, The *Lacteal* Vessels of the second sort, together with their Valves, which look from the *Mesenterick* Glands towards the *Receptacle* of the *Chyle*.

KKK, The *Lymphatick* Vessels

that go from the *Liver* into the *Sacculus Chyli*.

L, The *Receptacle*, or *Cistern*, or *Chyle-bag*.

MM, Part of the *Chyliferous Duct*, with their Valves.

N, The *Intercostal Nerves*, which make divers *Plexusses* in the *Mesentery*.

O, The *Lacteal* and *Blood-Vessels*, as they appear under the *Tunick* of the *Intestine*.

P, The exterior *Tunick* separated and hanging down.

F I G. II.

Shews the *ascending Chyliferous Duct*, with its divers Branches.

AA, The upper ascending part of the *Chyliferous Duct*, which was continued with MM of the foregoing Figure.

B, Its various Fissures and Branchings between the fourth and sixth *Vertebra* of the *Thorax*, through which some *Intercostal*

Branches go from the great Artery ; this Division often varies, as in C and D.

EE, The Insertion of this Duct in the *Subclavian Vein*, at whose Orifice there is a *Semilunary Valve*.

F, The Insertion of the other Branch into the *Jugular Vein*.

FIG. III. From *De Graaf*,

Shews the true *Pancreas* with its Duct.

AAAA, The *Pancreas* open, that its Duct may appear.

BBBB, A great many Glands conglomerated, which compass the *Pancreas*.

CCC, The Duct or Trunk of the *Pancreas*, running according to its length.

DDD, Lateral Ducts or Branches arising on both sides of the great Trunk, and dispersed into the Substance of the *Pancreas*.

EE, The *Intestinum Duodenum* opened, that the Insertion of the *Pancreatick Duct* may be seen.

F, The Entrance of the common *Pancreatick* and *Biliary Passage* into the *Duodenum*, about four Fingers breadth under the *Pylorus*.

GG, The *Cystick* and *Hepatick Duct*.

H, The common *Biliary Duct* inserted in the *Duodenum* F, and freed from the *Pancreas*, under which it lay hid.

T A B. XXIX.

FIG. I. From *Bartholin*, the III^d. from *Vesslingi s*, the rest according to *Dr. Glisson*, but alter'd by *Blancard*.

FIG. I.

THE hollow part of the Liver revers'd.

AA, The lower side or *Concave part* of the Liver.

B, Its external *Membrane* separated and hanging down.

CC, Two Trunks of the *Vena Cava* near the *Gibbous part* of the Liver.

D, The *Umbilical Vein* turn'd into a *Ligament*.

E, The Gall-Bladder, on which a *Lympheduct* is express'd.

Near F the *Ductus Cysticus* of the Gall-Bladder is express'd.

g, The *Ductus Hepaticus*.

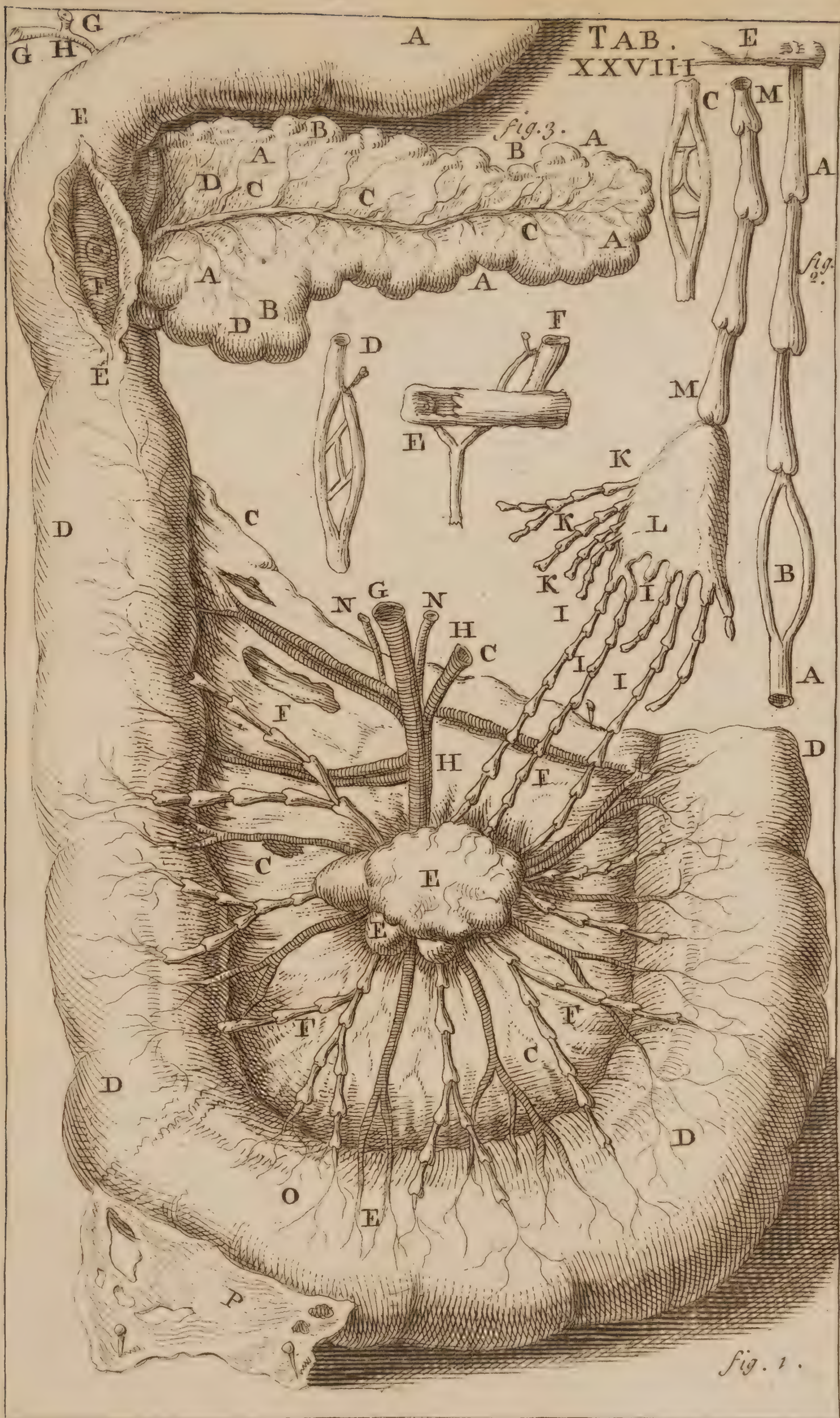
h, The common Gall-Duct.

I, One of the Arteries of the Liver.

K, The Branch which comes from the *Cæliack Artery*.

L, The Branch of the Artery which goes to the Gall-Bladder.

M, The



TAB. XXIX.

fig. 1.

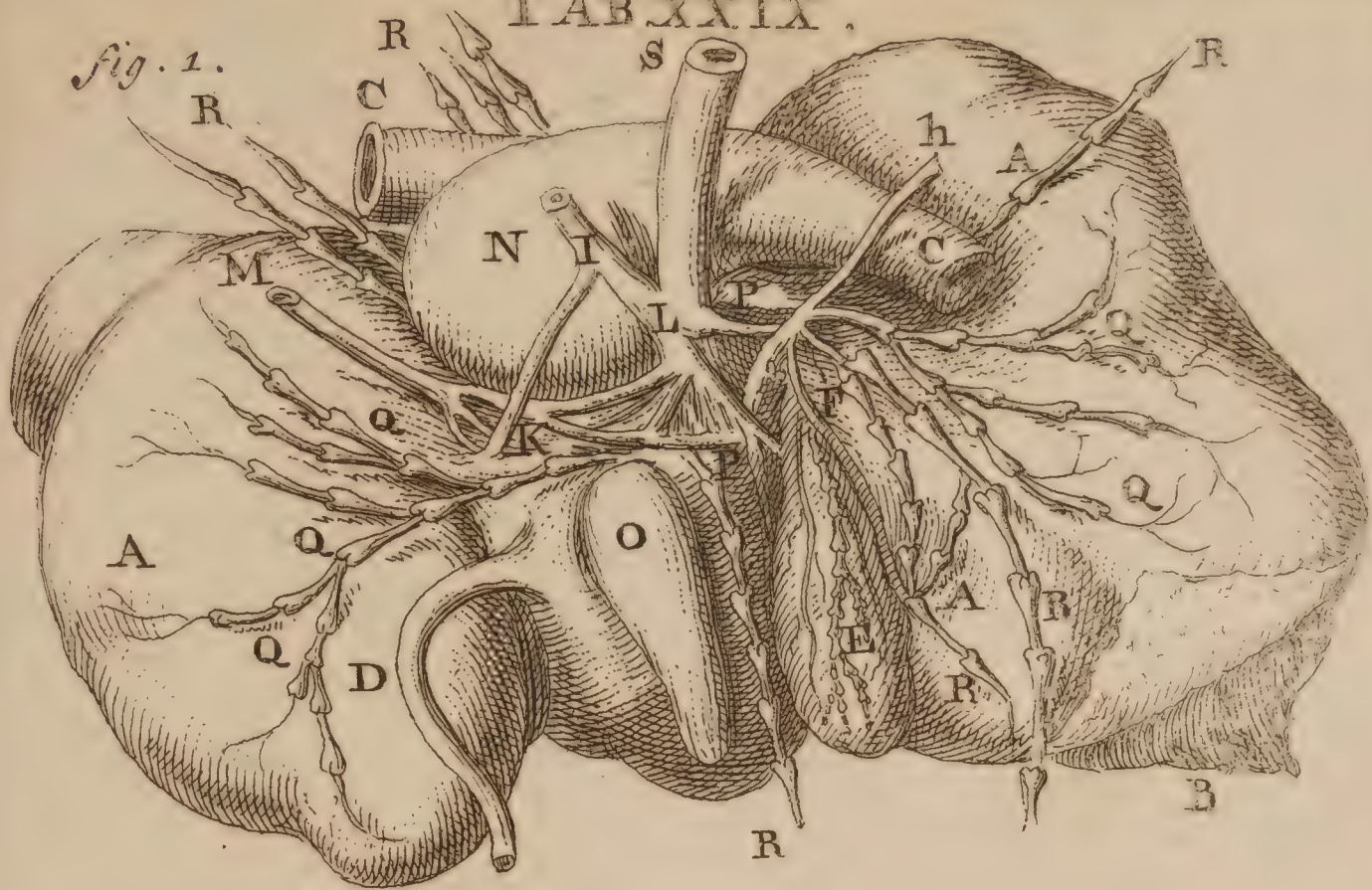


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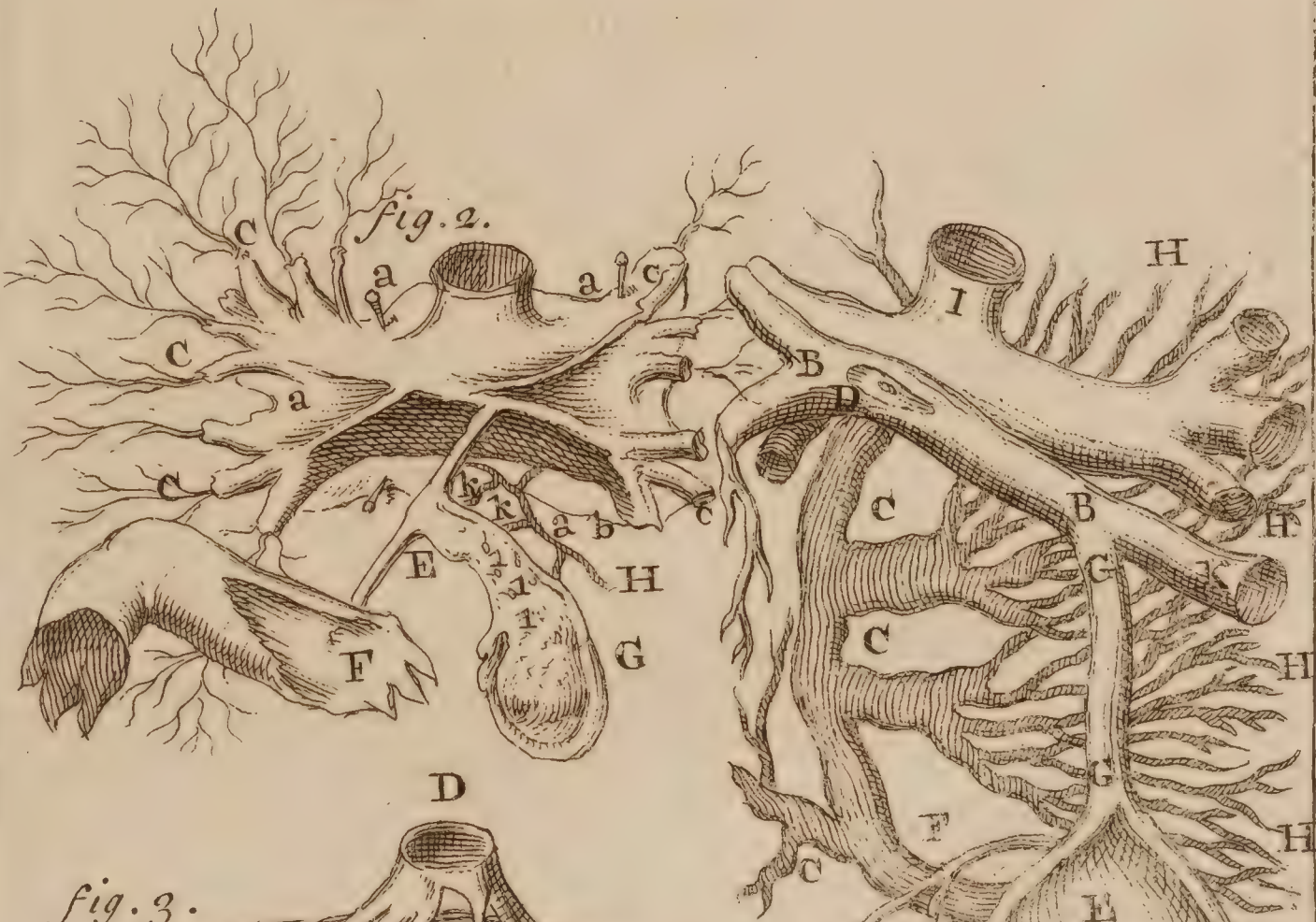


fig. 3.

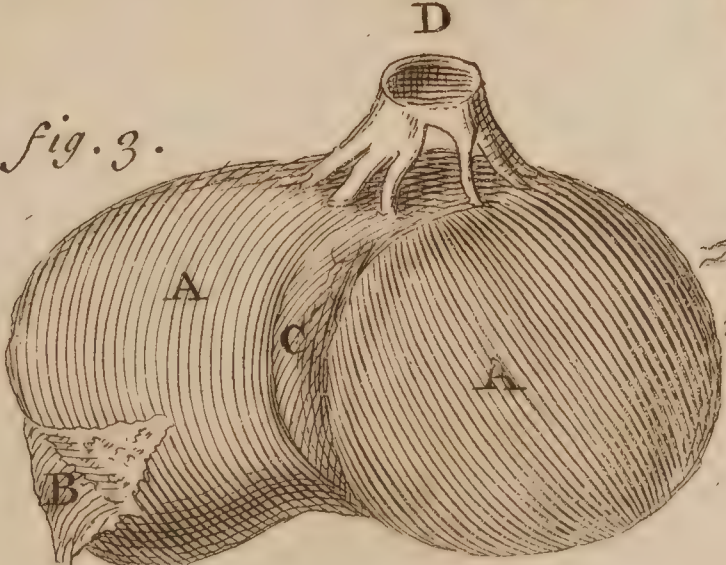
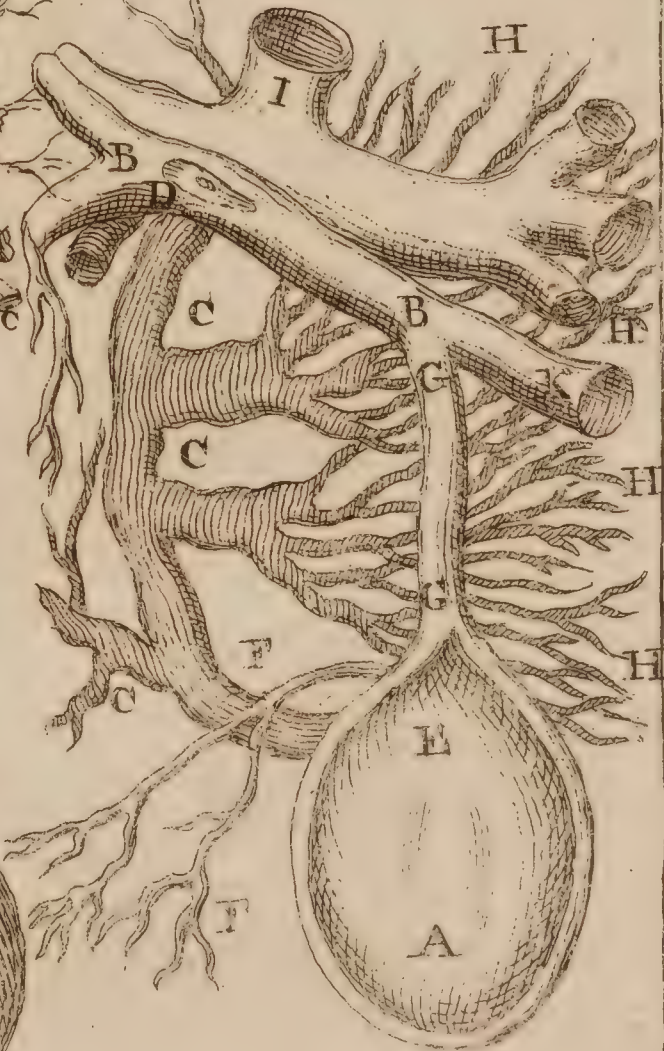


fig. 4.



The first thing I noticed
when I stepped out of the car
was the cold air. It was a
sharp contrast to the warm
interior of the vehicle.

I looked around and saw
the familiar streets of
London. The buildings were
tall and old, with many
windows. The cars were
moving slowly, and the
people were walking at a
steady pace.

I felt a sense of
peace and calm. It was
like I had found a new
home. The air was fresh
and clean. The people were
friendly and helpful. It was
all so different from what
I had experienced before.

I had heard that London
was a beautiful city, but
I didn't know how true it
was. Now I knew. It was
all so perfect. I was
in luck. I had found
the place I had been
looking for.

The second thing I noticed
was the smell. It was a
mix of old and new. It
was the smell of history and
progress. It was the smell
of a city that had been
built over time.

I had heard that London
was a beautiful city, but
I didn't know how true it
was. Now I knew. It was
all so perfect. I was
in luck. I had found
the place I had been
looking for.

I had heard that London
was a beautiful city, but
I didn't know how true it
was. Now I knew. It was
all so perfect. I was
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looking for.

I had heard that London
was a beautiful city, but
I didn't know how true it
was. Now I knew. It was
all so perfect. I was
in luck. I had found
the place I had been
looking for.

M, The Nerve from the *Infercostalis*.

N, A small Lobe of the Liver to which the *Omentum* is annex'd.

O, Another Lobe or Eminence call'd one of the *Portæ*.

P, A *Lymphatick* Gland.

Q Q, The *Lympheducts* arising out of the Liver, which are here express'd very large, not being done after the Life.

R R, Other *Lympheducts* arising out of the Gland (P P) into which the former were inserted, which convey the *Lymphæ* immediately from thence into the *Sacculus Chyli*. N.B. This Progress of *Lympheducts* is true in Nature, tho' it is here done from Invention.

FIG. II.

Shews the *Capsula* of Dr. *Glisson*, together with the *Vena Portæ*, and the Ramifications of the *Hepatick Ducts*.

aaa, The common *Capsula* of Dr. *Glisson* opened.

B, The Trunk of the *Vena Portæ* towards the Gibbous part of the Liver.

cccc, The five Branches of the *Vena Portæ* distributed through the whole Liver.

D, The Subdivisions of the *Gall-Duct*, included in the common *Capsula* as they pass to the Glandulous Bodies at the Extremities of the *Portæ* and the other Vessels.

E, The common *Gall-Duct*.

F, Its opening into the *Duodenum*.

G, The *Gall-Bladder* open'd.

H, The *Ductus Cysthepatici*, which arise from the Liver, and discharge their *Gall* into the *Ductus Cysticus*, and Neck of the *Gall-Bladder*.

iii, Their Apertures.

kkk, The Communication of the *Cystick* and other *Gall-Ducts*.

FIG. III.

AA, The Gibbous part of the Liver.

B, Its external Membrane separated.

C, Its Ligament call'd *Suspensorium*.

D, The *Vena Cava* dividing it self into Branches, as they come out of the Liver.

FIG. IV.

A, The *Gall-Bladder* open'd.

BB, The *Ductus Hepaticus*.

CCC, The *Ductus Cysthepatici*.

D, The *Ductus Hepaticus* open'd, that the *Cysthepatici* may be seen.

E, Another opening of the *Cysthepatick Ducts* into the *Gall-Bladder*, where a Valve is placed to prevent the return of the *Gall*.

FF, A *Gall-Duct* passing out of the Bladder into the Liver.

GG, The *Ductus Cysticus* joining with the *Ductus Hepaticus* and *Communis*.

HHH, Branches of the *Cysthepatick Ducts* dispersed through the Inside of the Liver.

I, *Vena Portæ*.

K, The *Ductus Communis* which carries the *Gall* to the *Duodenum*.

T A B. XXX.

FIG. I.

AAAA, **T**HE concave part of the Spleen from *Veslingius*, with the Addition of the Lympheducts.

B, The Splenick Artery.

CC, The *Vena Portæ*.

DD, The lymphatick Vessels, with their Valves.

E, The intercostal Nerves.

FIG. II.

Shews the *Spleen* of an Ox from Dr. *Higmore*.

AA, The Substance of the *Spleen* cover'd with its proper *Tunick*.

BB, The *Tunick* of the *Spleen* dissected, and turn'd inside outwards, that the Progress of the Vessels, and the *Plexus* of the Fibres may be seen better.

C, A part of the *Vena Portæ*.

D, Its left Branch called the *Splenick*.

E, That Branch opened near the *Spleen*, that the *Valve* may be seen.

F, A part of the *splenick Artery*, which goes thro' the whole *Spleen*.

G, Nerves that go thro' the Sides of the *splenick Artery*.

HHH, The Artery going thro' the whole *Spleen*.

III, Nerves going through the Sides of the *splenick Artery*.

KKKK, Some nervous Fibres very much complicated, between which the Branches of the Arteries

run, and are lost in its vesiculous Substance.

N. B. Tho' Authors, particularly Dr. *Higmore*, have describ'd *Valves* in the *Vena Portæ*, it is certain it has no *Valves* in it.

FIG. III.

Shews the Trunk of the great Artery, and the *Vena Cava*, &c. from *Veslingius*.

AA, The right and left Kidney in their proper Place.

B, Its *Tunick* separated and hanging down.

CC, The *Glandula Renales*.

DD, The Trunk of the *Vena Cava*.

GG, The Trunk of the great Artery.

HH, The emulgent Veins.

II, The emulgent Arteries.

cc, The Arteries of the Testicles.

dd, The Veins of the Testicles.

ee, The spermatick Blood-Vessels as they pass to the Testicles in one common covering of the *Peritoneum*.

f, The *Arteria Adiposa*.

g, The *Vena Adiposa*.

hh, The *Ureters*.

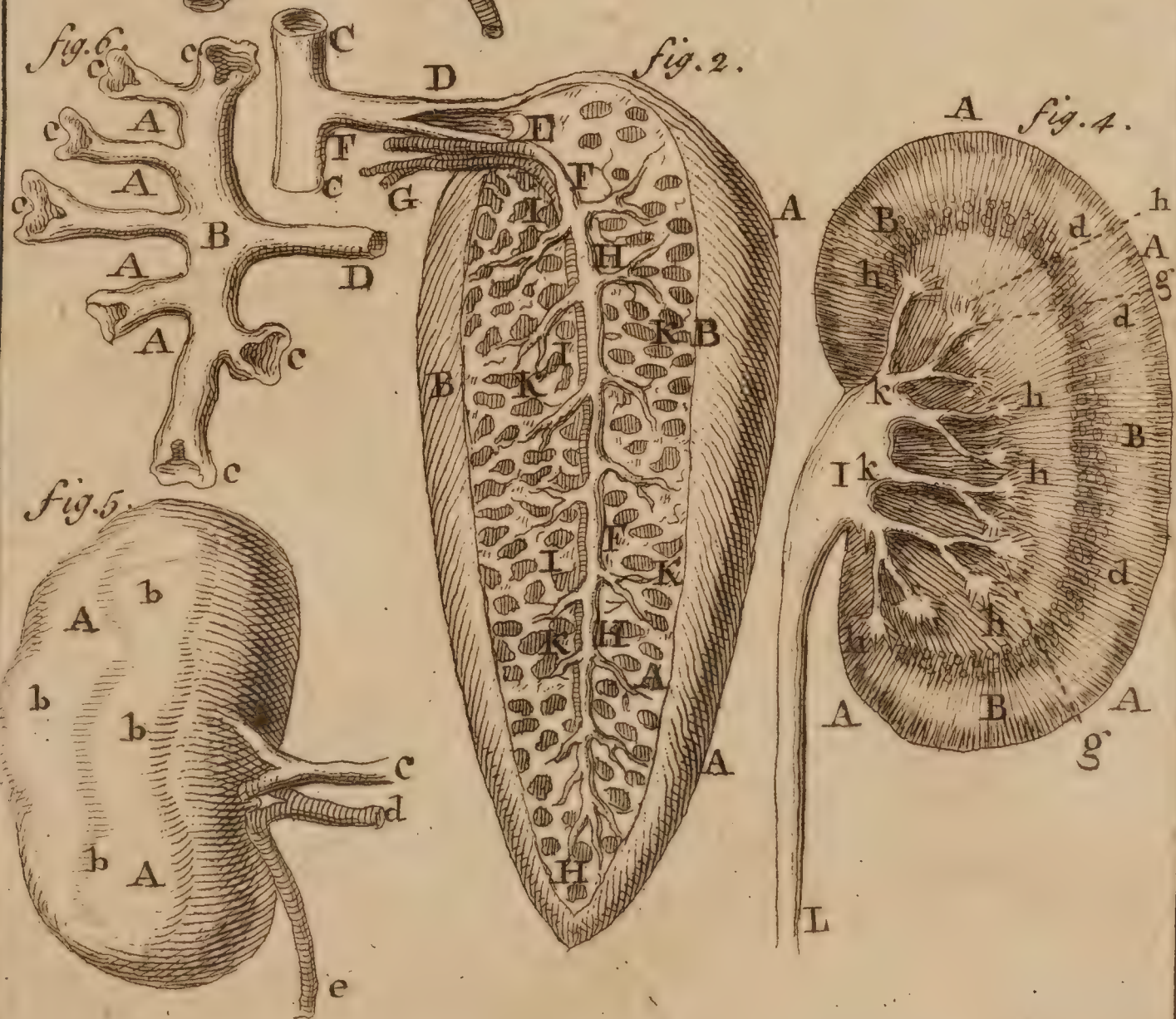
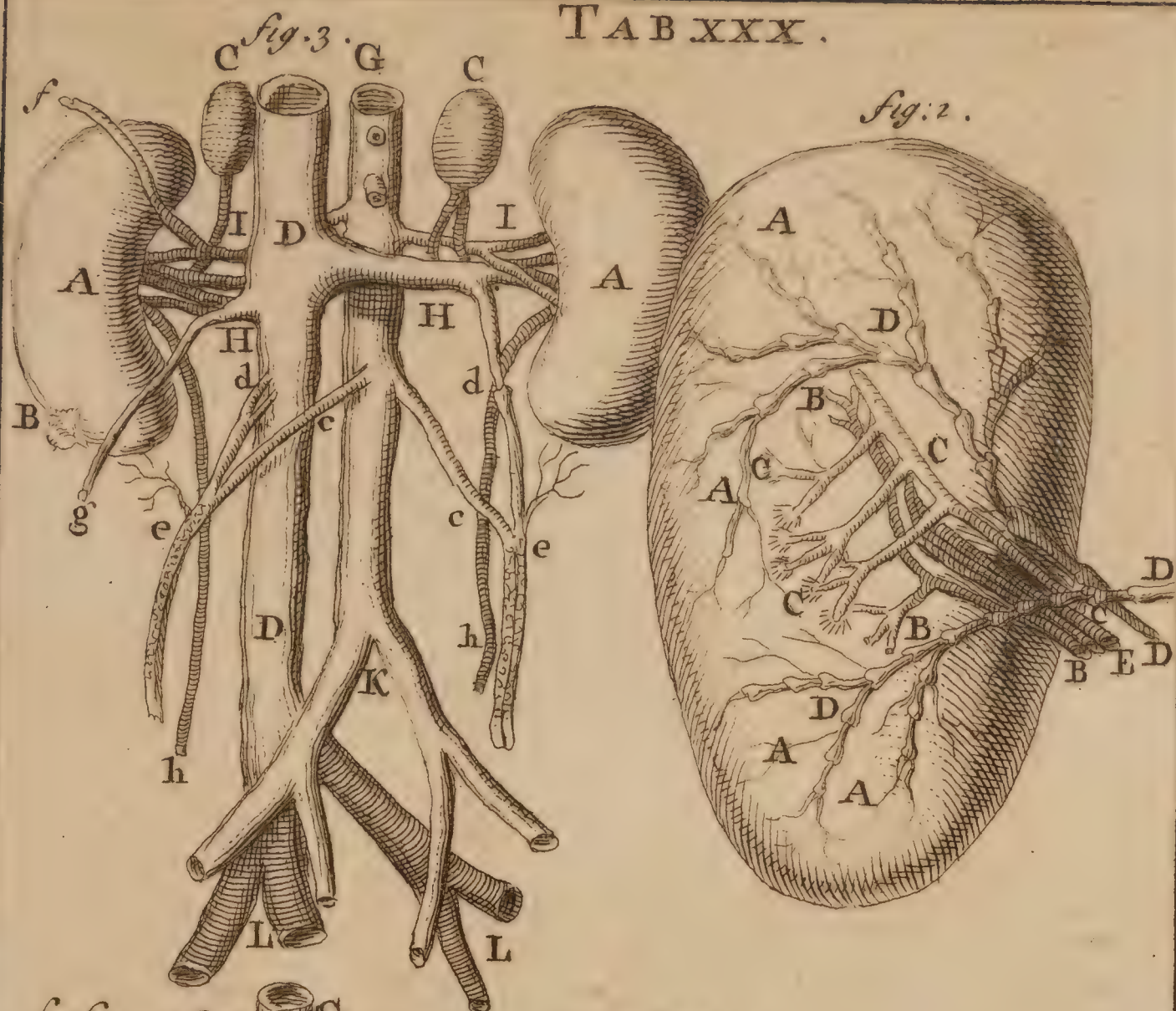
KK, A branching of the Arteries going towards the Thighs.

LL, A branching of the *Vena Cava* going towards the Thighs.

FIG. IV.

AAA, The Kidney dissected in the middle.

BBB, The



BBB, The *Urinary Pipes* arising from the Glands of the Body of the Kidny, and passing towards the *Papilla*.

ddd, The glandulous *Acini* dispersed between the *Urinary Passages*.

gg, The interior *Urinary Pipes* going from the glandulous *Acini* into the *Pelvis*, whose meeting together make as it were *Caruncles*, from which the *Urine* passes into the *Pelvis*.

hh, The *Caruncula* made by the meeting of the *Urinary Pipes*.

I, The *Pelvis*.

KKK, The beginning of the *Pelvis* in the Kidny.

L, Part of the *Ureter* cut off.

FIG. V.

AA, A Child's Kidny divided into divers little Bodies, or Lobes, covered with one common Membrane.

bbb, Many Protuberancies of the little Bodies not yet joined together.

c, The *Emulgent Artery*.

d, The *Emulgent Vein*.

e, The *Ureter*.

FIG. VI.

AAAA, The urinary Pipes of the *Pelvis*.

B, The *Pelvis*.

ccccc, The open Ends of the Pipes of the *Pelvis*, which receive the *Caruncula*.

D, Part of the *Ureter* cut off near the *Pelvis*.

T A B. XXXI.

FIG. I, III, IV, and V, from Bidloo.

FIG. I.

Represents part of the *Liver* boiled, view'd through a Microscope.

AA, The *external Tunick* of the *Liver* rais'd.

BBBB, The *Glands* that compose the *Liver*.

C, The *fibrous* and *membranous* Connection of these Bunches of *Glands*.

DE, The *sanguinary* and *biliary* Vessels distributed to the *Glands*.

FIG. II.

Shews the Kidny dissected from the gibbous part to the *Pelvis*.

AAAA, The glandulous *Acini* dispers'd thro' the Kidnies.

BBBB, The *Urinous Pipes*, which convey the *Urine* from the glandulous *Acini* into the *Pelvis*.

C, The *Pelvis*.

D, The Mouth of the *Ureter*.

FIG. III.

Shews the Vessels of the Kidnies, *Pelvis*, and *urinous* Ducts.

AAAA, One

AAAA, One half of the Kidny dissected from the other.

BBBB, Urinary Pipes going from the glandulous *Acini* to the *Pelvis*.

CCCC, The glandulous *Acini*.
D, The *Pelvis*.

E, The *Ureter*.

FFF, The Emulgent Vessels.

FIG. IV.

The whole Kidny divided from its Gibbous part to the *Pelvis*, and display'd.

AAAA, The Kidny dissected.

BB, The Urinary Pipes.

CCC, The *Glands* which compose the external Surface of the Kidny.

D, The *Pelvis*.

EEEE, The places where the Urine comes out of the glandulous Pipes into the *Pelvis*, call'd the *Caruncula*.

F, The way out of the *Pelvis* into the *Ureter*.

G, The *Ureter* passing down.

FIG. V.

The Blood-Vessels and Urinary Tubes of the Kidny, express'd by a Microscope.

A, The proper Membrane of the Kidny.

BB, The Ends of the Blood-Vessels broke off.

CC, The Blood-Vessels of the Kidny, which help to compose its *Glands*.

DD, The *Glands* of the Kidny composed of Blood Vessels, Urinary Tubes, Nerves, and Lympheducts.

E, The Urinary Tubes, in their way from the *Glands* to the *Papilla*.

F, The Urinary Tubes cut off which pass'd to *Glands* beyond those here express'd.

G, The *Caruncula* or *Papillary* Body framed by meeting of the Urinary Tubes.

H, A Branch of the *Pelvis* cut off, which receives the Urine from the Tubes of the *Caruncula*.

T A B. XXXII.

From Regn. De Graaf.

FIG. I.

a, **T**HE Trunk of the Vein of the *Testicle* cut from the *Vena Cava*.

bb, Branches of this Vein which arise from the *Peritoneum*.

c, Its first division into two Branches, which are various-

ly subdivided and united again.

ddd, The *Valves* which appear like Knots when the Vein is distended with Wind or Wax.

eee, The various Divisions and Unions of the Veins, by which the reflux Blood (after the *Semen* is prepared in the *Testicle*)

fig. 2.

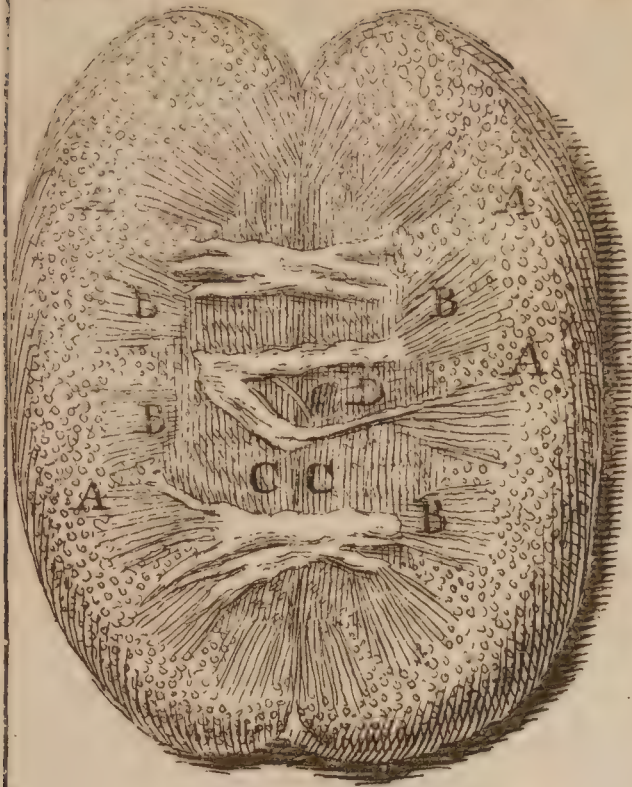


fig. 3.

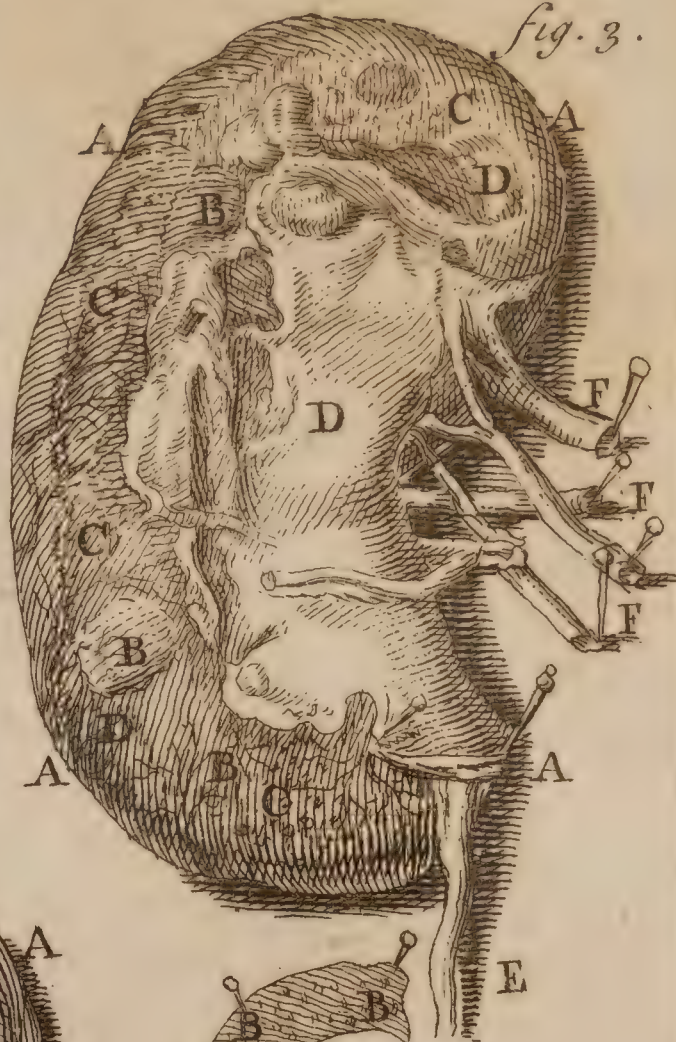


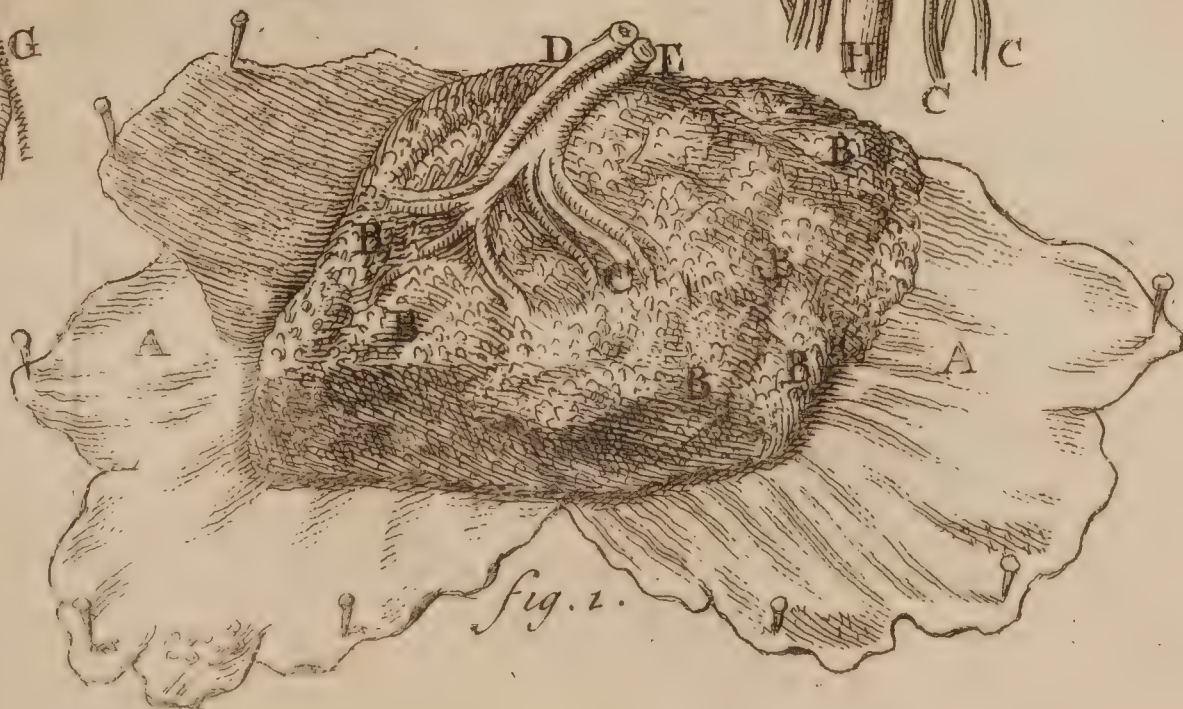
fig. 4.



fig. 5.



fig. 1.



Testicle) if it should be detain'd in one Ramification, may return towards the Heart again by the other.

FF, The upper part of the Testicle from whence these Branches may be said to arise.

ggg, The Ramifications of the Blood-Vessels of the Testicle.

H, The Body of the Testicle.

I, The large round End of the Epididymis firmly cleaving to the upper-part of the Testicle.

S, The middle part of the Epididymis loosely cleaving to the Testicle.

K, The lesser round part of the Epididymis, firmly cleaving to the lower part of the Testicle.

LL, The Vas Deferens cut off near its middle between the Testicle and the Vesicula Seminalis.

M, The Artery of the Testicle passing from the Aorta to the Testicle.

N, Its Division into two Branches.

O, The larger Branch which is implanted into the upper-part of the Testicle, and descends along its back towards the lower part of the Testicle R, to which the lesser end of the Epididymis is annex'd; which again passes back on the Belly of the Testicle, where it is divided into divers Branches.

P, The lesser Branch which runs to the Epididymis.

R, The greater Branch descending on the Testicle.

FIG. II.

The Vas Deferens and part of the Epididymis unravell'd.

A, Part of the Vas Deferens in which its Cavity may be seen.

B, The Serpentine Turnings, about the middle of the Epididymis, unravell'd.

CDEFG, Divers parts of the Epididymis so unravell'd, that its whole Body appears to be one continued Vessel folded up, which grows still less and less as it approaches the upper-part of the Testicle.

H, The larger end or beginning of the Epididymis, near which its Vessel (or single Trunk) is divided into divers Branches.

I, The Belly of the Testicle.

K, The Artery of the Testicle, which ascends from the lower part of it through its Belly.

L, The Ramifications of the Veins of the Testicle.

FIG. III.

A, The Vessels of the Testicles inclosed in their common Trunk.

bb, The Veins of the Testicles running to the sides of the Testicles.

B, The Tunick Elythroides, or Erythroides.

c, The Artery ascending through the Belly of the Testicle.

D, The Albugineous Tunick inclosing the Testicle.

E, Part of the Tunica Vaginalis drawn back.

F, The Cremaster Muscle hanging down.

g, The greater round End of the Epididymis.

H, The middle part of the same.

I, The

I, The *lesser* End of the same.
K, The *Vas Deferens* cut off.

FIG. IV.

Shews a Dog's Testicles.

A, The Blood-Vessels as they lie in their proper covering.

B, Their Branches tending to the *Epididymis*.

C, The chief Branch of the Artery of the Testicles passing through the Belly of the Testicle.

EE, The Branchings of the Veins.

F, The Testicle with the Seed in it.

g, The greater End of the *Epididymis* full of Seed.

H, The *lesser* End of the same extended with the Seed.

I, The End of the *Epididymis*, or the Beginning of the *Vas Deferens*.

K, The *Vas Deferens* bound about in the *Inguen* of a Dog before Coition, without hurting the *Vasa Preparantia*, that the Seminary Vessels, when full of Seed, may be seen distended.

FIG. V.

a, The greater End of the *Epididymis* turn'd *inside* outwards, that the Ducts and Branches of the *Epididymis*, and their course, may be view'd.

B, The Upper-part of the Testicle, from which the Seminal Vessels go, which compose the greater End of the *Epididymis*.

c, The Vessels of the Testicles cut off.

ddd, The Branchings of the Vessels of the Testicles.

E, The Body of the Testicle of a Dog.

FIG. VI.

A, The Testicle of a Dog cut a-cross.

BBB, The Seminal Vessels as they lie between the Membranes in a peculiar order.

C, The Root of the *Epididymis* described by Dr. Highmore.

FIG. VII.

AAA, The Seminal Vessels of the Testicles placed in a peculiar order between the smaller Membranes.

B, The Seminal Vessels going through that Membranous Substance that joins to the Back of the Testicles.

C, Divers Seminal Vessels, perforating the *albuginous* Tunick cut off, before they make up the round End of the *Epididymis*, after a Serpentine manner, as may be seen in Fig. 2. H.

DDDD, The *albugineous* Tunick open'd in the fore-part of the Testicle, and separated from it.

FIG. VIII.

A, The Testicle cut a-cross.

BBB, The several Dispositions of the Seminal Vessels.

C, The meeting of all the Membranes which part the Seminal Vessels at the Back of the Testicle.

FIG.

FIG. IX.

AA, The Body of the *Prostates* divided in the fore-part.

B, The *Urethra* open'd also in the upper-part.

CCC, The *Ducts* of the *Prostate* or *glandulous Body* denuded.

C The place of the *Caruncle* through which the *Seed* passes from the *Testicles* and *Vesicula Seminales* into the *Urethra*.

FIG. X.

A, The *Bladder* of *Urine*.

B, That part of the *Bladder* to which the *Urachus* is join'd.

CA, The *Bladder* open'd in the fore-part.

dd, The *Ureters*.

EE, The *Orifice* of the *Ureters* in the *Bladder*.

F, The *Neck* of the *Bladder* open'd.

gg, Parts of the *Vasa Deferentia* cut off.

hh, *Vessels* going to the *Vesicula Seminales*.

II, The *Vesicula Seminales* distended.

K, The *Caruncle* with its two *Foramina* through which the *Seed* passes from the *Vesicula Seminales* into the *Urethra*.

LL, The *glandulous Body* or *Prostates* divided in the fore-part.

MM, The *Mouths* of the *Ducts* of the *Prostates* opening at the sides of the *Caruncle*, which if not distended are imperceptible, or seem no bigger than *Points*.

FIG. XI.

A, The *Artery* of the *Testicle*, as it is generally found in *Humane Bodies*.

B, The *Division* of the same *Artery* into two *Branches*.

CC, The greater *Branch* going to the *Testicle*.

DD, The lesser *Branch* passing to the *Epididymis*.

E, The greater *End* of the *Epididymis* joining to the *Testicles*.

FF, The *Epididymis* turn'd inside outwards, to see which way the *Artery* goes under it.

G, The *End* of the *Epididymis*.

H, A part of the *Vas Deferens*.

T A B. XXXIII.

From De Graaf.

FIG. I.

Shews the Communication of the *Vasa Deferentia* with the *Vesicula Seminales*.

AA, Parts of the *Vasa Deferentia*, with small Cavities appearing in their thick sides where they are cut off.

B, Those parts of the *Vasa Deferentia*, where their Cavities are dilated, and their Sides thinner.

CC, The Extremities of the *Vasa Deferentia* again contracted, and opening with a small Foramen into the Neck of the *Vesicula Seminales*.

DD EE, The *Vesicula Seminales*, blow'd up to shew the Turnings and Windings of their Surface.

FF, The Vessels passing to the *Vesicula* ———.

g, The Membranes which hold the *Vesicula Seminales* and *Vasa Deferentia* in their natural Situation.

HH, The Blood-Vessels that accompany the *Vasa Deferentia*, and give Branches to their sides.

I, The common Ducts to the *Vesicula Seminales* and *Vasa Deferentia*, which pass distinctly on each side to their Appertures, at the sides of the *Caput Gallinaginis* or *Caruncula*.

KK, The Orifices of the Ducts of the *Prostates*, which open into the *Urethra* of the sides of the *Caput Gallinaginis* or *Caruncle*.

LL, The *Prostate* and *Urethra* divided on their fore-parts, to shew the inside of the

MM, *Urethra*.

FIG. II.

The back parts of the *Penis*, *Vesicula Seminales* and *Prostates*.

AA, Portions of the *Vasa Deferentia*.

B, Those parts of the *Deferentia* which are dilated.

CC, The Vessels that go to the *Vesicula Seminales*.

DD, The *Vesicula Seminales* blow'd up.

EE, The back-part of the *Prostates* which lay on the *Intestinum Rectum*.

F, The *Urethra*.

g, The meeting of the *Vasa Deferentia* with the *Vesicula Seminales*.

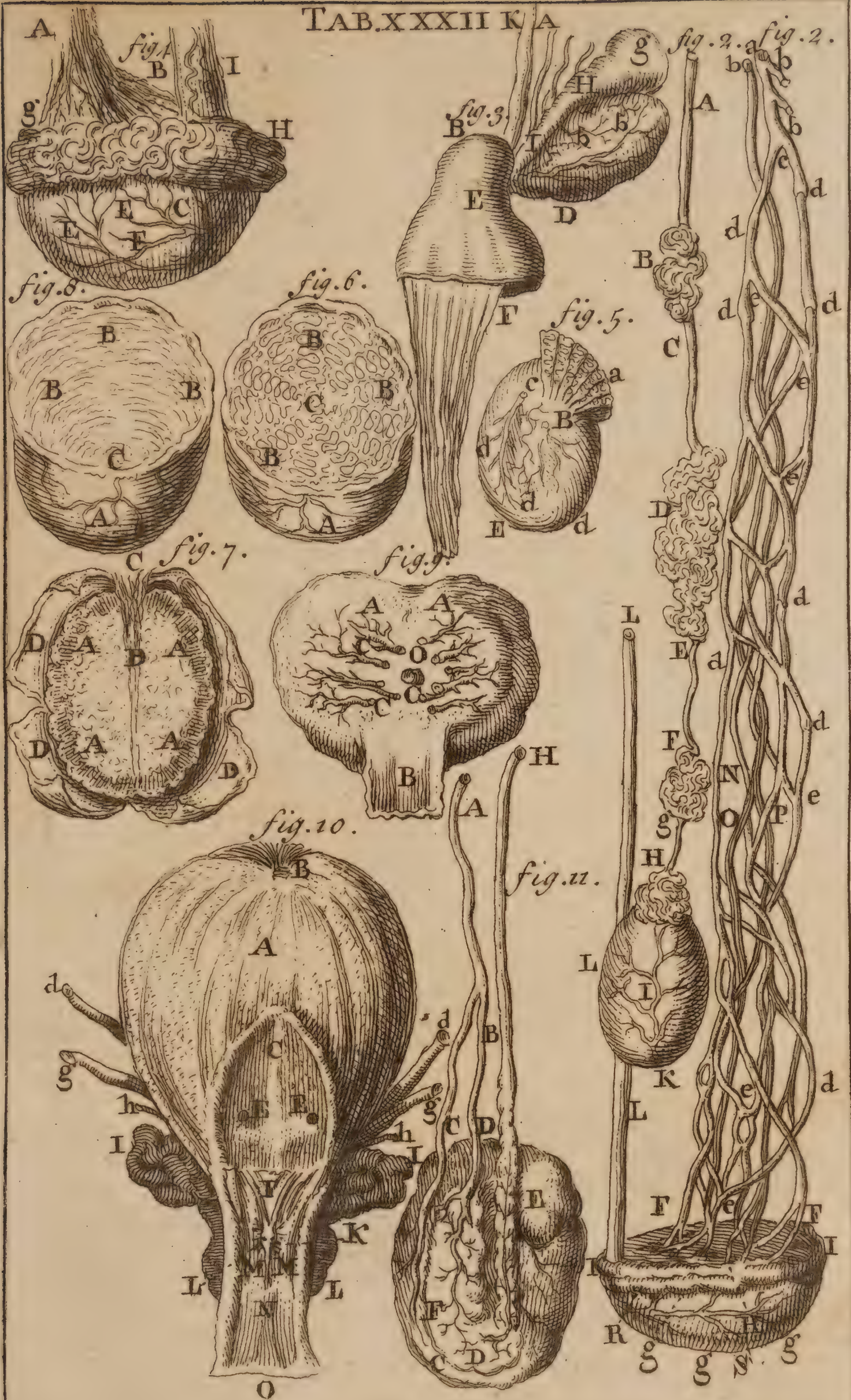
HH, The *Musculi directores Penis*.

I, The *Musculus Accelerator* rais'd on one side.

L, The Bulbous part of the *Urethra* underneath.

M, The *Urethra* with its spongy part on it.

NN, The



NN, The Nervous Bodies of the Penis.

O, The lower part of the Glans.

FIG. XII.

AA, The two Veins which join into one Trunk on the *Dorsum penis*.

B, The Vein of the *Dorsum penis* open'd to shew a Valve in it.

FIG. III.

The Penis divided according to its length from its upper part or *Dorsum* to the Urethra.

AA, The Nervous or Cavernous Body of the Glans divided.

BB, The Membranes or Capsulae of the Cavernous Bodies drawn aside.

C, The Artery of one side passing through the spongy substance of the Cavernous Body.

D, The Membranaceous spongy substance in which the Artery passes.

EE, The Septum intermedium.

FF, The Fibres of the Septum intermedium which ascend to the *Dorsum penis*, and are divided like the Teeth of a Comb.

GG, The Urethra cut off near the Prostates.

H, The middle part of the Urethra.

I, Its End which perforates the Glans.

KK, The spongy substance of the Urethra.

LL, The beginnings of the Cavernous Bodies dilated like two little Bags.

MM, The *Musculi Erigentes* or *Extendentes penem*.

FIG. XXX.

The side of the Penis open'd according to its length.

AA, The Glans bor'd.

B, The Frenum.

CC, A portion of the Skin remaining, from whence the rest that cover'd the Penis is cut off.

DD, The Urethra lying under the Nervous Bodies.

EE, The Membrane or Capsula of the Nervous Body divided.

FF, The Artery running through the spongy substance of the Nervous Body.

GG, The spongy substance of the Nervous Body.

HH, The Orifices of the two Arteries cut off as they pass the Corpora Nervosa.

I, The Cavity of the Urethra, whose lower part is cover'd with

K, Its proper Cavernous substance.

LL, The Septum intermedium of the Corpora Cavernosa Penis.

Note, That these Letters refer to the original Figure of De Graaf, but are ill placed here, either thro' the Inadvertency of *Blancard*, or his Graver; the like may be said of many more of these Figures, wherefore the Curious must have recourse to the Originals.

FIG. IV.

Part of the *Penis* cut transversly.

AA, The *spongy* and *fibrous* substance of the *Nervous Bodies*.

bb, The two *Arteries* which pass through the *Corpora Cavernosa*.

C, The *Meatus Urinarius*.

D, The *spongy* substance of the *Urethra*.

E, The *Septum intermedium*.

FF, The *Capsula*, or *strong* Membrane of the *Corpora Nervosa*.

G, The *thin* Membrane on the *Cavernous* substance of the *Urethra*.

H, The large *Vein* passing on the back of the *Penis*.

FIG. V.

The *Pudendum* of a *Woman*.

A, The *Glans Clitoridis*.

B, Its *Præputium*.

CC, The *Nymphæ*.

D, The *Meatus Urinarius*.

EEE, The *Coarctation* of the *Orifice* of the *Vagina*, as we found it (says *De Graaf*) in a *Virgin* of 24 years old.

F, The *Orifice* of the *Vagina* a little dilated.

GG, The *Labis pudendi* drawn from each other.

H, The *Seam* or little *Bridle* of the *Lips*.

I, The *Perinaeum*.

K, Part of the *Anus*.

FIG. VI.

The fore-part of the *Clitoris*.

A, The *Clitoris*.

B, Its *Crura*.

C, Its *Glans*.

D, Its *Præputium*.

EE, The *Nymphæ*.

FF, Part of the *Periosteum*, by which the *Crura* of the *Clitoris* is annex'd to the lower part of the *Ossa Pubis*.

GG, The *Muscles* of the *Clitoris*.

HH, Those parts of its *Muscles* implanted on the *Ossa Ischii* or *Coxendicis*.

II, The *Nerves*,
K K, The *Arteries*,
LL, The *Veins*,
which pass to all the parts of the *Pudendum*.

MM, The *fleshy* *Fibres* of the *sphincter* *Muscle* annex'd to the *Nervous* substance of the *Clitoris*.

FIG. VII. and VIII.

Parts of the *Clitoris* variously dissected.

A, Fig. 7. The *spongy* substance of one of the *Crura* without a *Septum intermedium*.

A, The *Clitoris*.

B, The *Glans Clitoridis* with parts of the *Nymphæ*.

CC, The *spongy* substances of the *Clitoris* divided from each other by a *Septum*.

FIG. IX, X, XI.

Shews the *Conformation* of the *Orifices* of the *Vagina*, as they are found in young *Bodies* of different *Ages*.

Fig. 9. Represents the *Pudendum* of an *Infant*.

Fig. 10.



Fig. 10. Represents the *Pudendum* of a Girl of six years old.

A, The Orifice of the *Vagina*.

BBB, The Wrinklins of the Membranes about the Orifice of the *Vagina* call'd the *Hymen*.

C, The Orifice of the *Meatus Urinarius*.

DD, The Lips drawn from each other.

E, The *Clitoris*.

FF, The *Nymphæ*.

Fig. 11. The same *Pudendum* after its upper-part is dissected.

A, The Orifice of the *Vagina*
BB, Its *rugous* Membrane call'd *Hymen*.

CCC, The fore-part of the *Vagina* cut off.

DD, The *Meatus Urinarius* divided through its middle.

ee, The *Nymphæ*.

FF, The Lips of the *Pudendum*
gg, Parts of the *Vagina* dissected; and drawn from each other.

H, The *Internal* or wrinkled Tunick of the *Vagina*.

T A B. XXXIV.

The Foreparts of the *Genitals* of a *Woman* taken out of the *Body*, and placed in their natural Site, from *Regnerus de Graaf*. This Figure shews the Parts revers'd; that which here is said to be of the Right Side being of the Left, and vice versa.

AA, THE Trunk of the *Arteria Magna*.

BB, The Trunk of the *Vena Cava*.

C, The right Emulgent Vein.

D, The left Emulgent Vein.

E, The left Emulgent Artery.

F, The right Emulgent Artery.

HH, The *Ureters* cut off.

I, The right *Spermatick* Artery.

K, The left *Spermatick* Artery.

L, The right *Spermatick* Vein.

M, The left *Spermatick* Vein
NN, *Arteria Iliacæ*.

OO, *Vena Iliacæ*.

PP, The internal Branches of the *Arteria Iliacæ*.

QQ, The external Branches of the *Arteria Iliacæ*.

RR, The internal Branches of the *Vena Iliacæ*.

SS, The external Branches of the *Vena Iliacæ*.

TT, The *Hypogastrick* Arteries that go to the *Uterus* and *Vagina*.

VV, The *Hypogastrick* Veins that go along with the said Arteries.

XX, The *Branches* of the *Hypogastrick* Arteries that go to the Urinary Bladder.

YY, The *Branches* of the *Hypogastrick* Veins that go to the Bladder.

ZZ, *Portions* of the *Umbilical* Arteries.

a, The bottom of the *Uterus* cover'd with its common *Tunic*.

bb, The round *Ligaments* of the *Uterus* as they are join'd together in its bottom.

cc, The *Tubæ Fallopianæ* in their natural Position.

dd, The *Edges* of the *Tubes*.

ee, The *Foramina* of the *Tubes*.

ff, The *Testicles* in their natural Position.

g, A portion of the *Rectum*.

h, The Neck of the Womb without its *Tunic*, that the Vessels may be seen the better.

i, The fore-part of the *Vagina* of the *Uterus* freed from the Urinary Bladder.

k, The Urinary Bladder contracted.

ll, The *Sanguineous* Vessels running through the Bladder.

m, The *Musculus Sphincter* of the Neck of the Bladder.

n, The *Clitoris*.

oo, The *Nymphæ*.

p, The Urinary Passage.

qq, The *Lips* of the *Pudendum*.

r, The Orifice of the *Vagina*.

T A B. XXXV.

All from De Graaf.

The Bladder of Urine and Uterus, &c. of a Woman.

FIG. I.

THE fore-part of the *Urethra* with part of the Bladder of the Urine open'd.

A, The Bladder of Urine.

C, The Neck of the Bladder open'd.

D, The *Urethra* open'd according to its length.

E, The Orifice of the *Urethra*, and the Passages of the *Lacuna* into it.

FF, The *Lacuna* going thro' the *Prostatæ*.

FF, The *Lacuna* taken out of the Glandulous Body of the *Prostatæ* and blown up.

GG, The internal substance of the *Prostatæ*, or the Glandulous Body.

II, The sides of the Bladder of Urine separated from one another after the division.

BB, The *Ureters* cut off.

NN, The *Lips* of the *Pudendum*.

L, The Orifice of the *Vagina*.

MM, The carnos Fibres of the *Sphincter* cut off.

FIG.

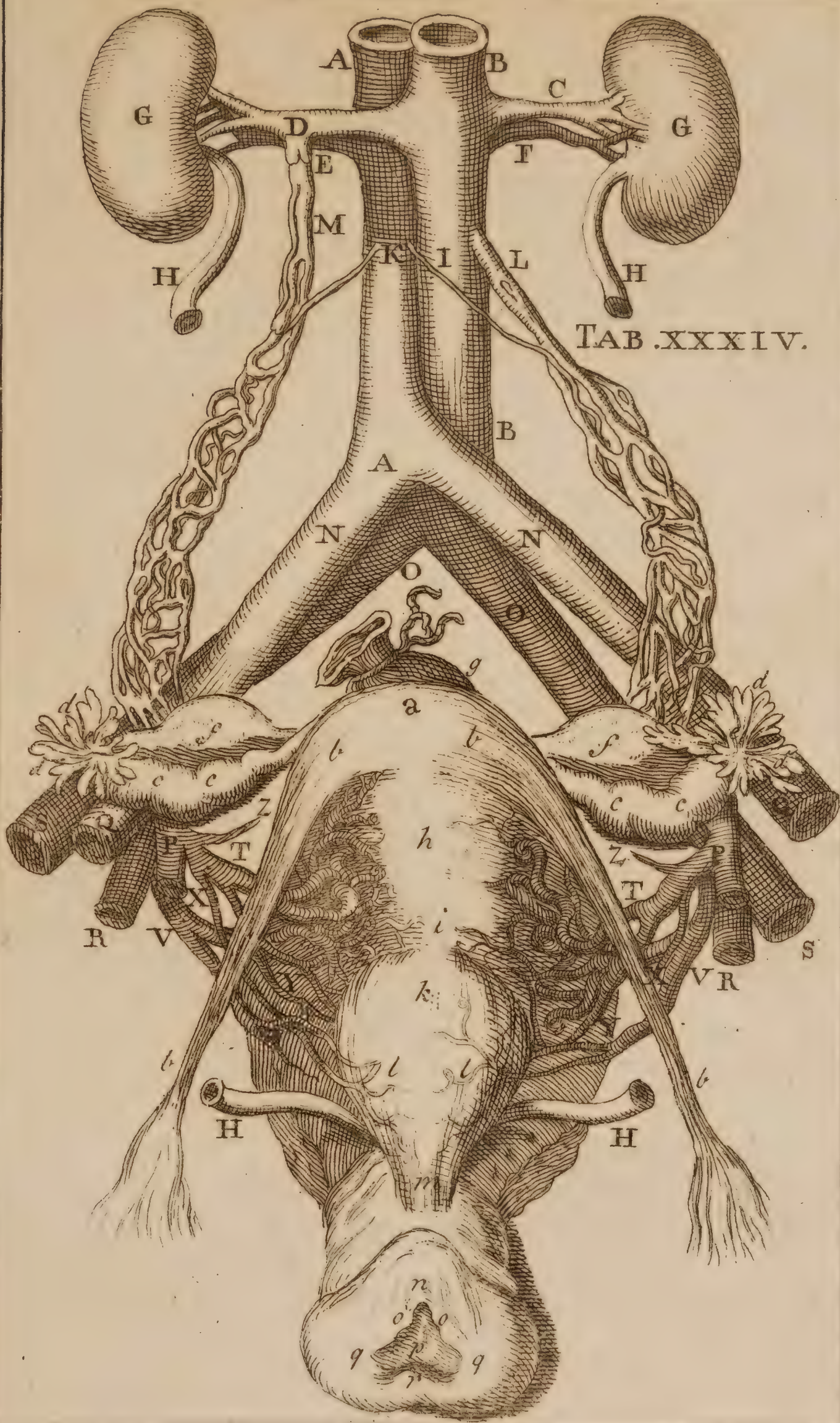


fig. 1.



TAB. XXXV.
fig. 3.



fig. 4.



fig. 5.

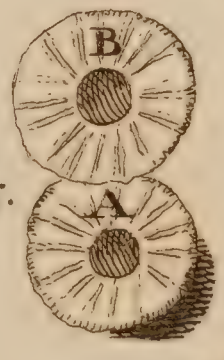


fig. 8.



fig. 2.

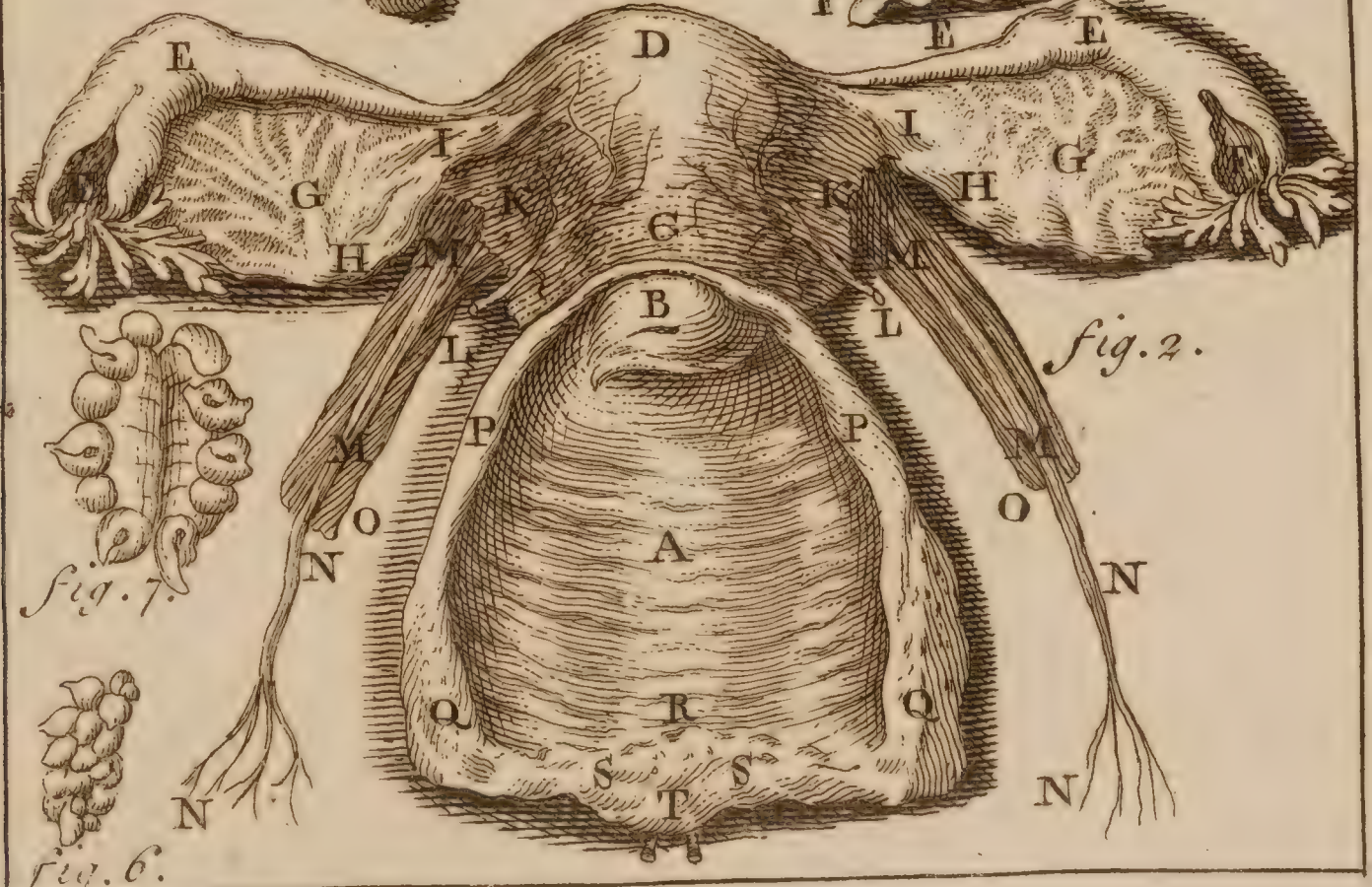


fig. 7.

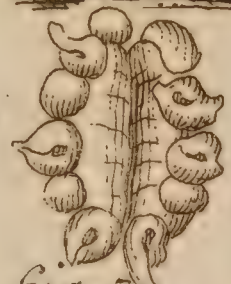


fig. 6.





FIG. II.

Shews the *Vagina* of the *Uterus* open'd on the backside length-ways.

A, The wrinkled internal Membrane of the *Vagina*.

B, The internal *Osculum uteri* bending down at the upper-part of the *Vagina*.

C, The Neck of the *Uterus*.

D, The Bottom of the *Uterus*.

EE, The *Tuba Fallopiana*, or *Oviducts*.

FF, The internal rugous Membrane of the *Oviducts*.

GG, Nerves and Blood-Vessels dispersed through the *Ligaments* that are like Bars Wings.

HH, The *Testicles* or *Ovaria*.

II, The *Ligaments* of the *Testicles*, commonly call'd the *Vasa Deferentia*.

KK, Portions of the broad *Ligaments*.

LL, Small Nerves dispersed (as we sometimes see) through the *Uterus*.

MM, The Portions of the round *Ligaments* that lie in the *Abdomen*.

NN, The Portions of the same without the *Abdomen*.

OO, The Parts of the *Peritoneum* cleaving to the *Ligaments* while they are within the Cavity of the *Abdomen*.

PP, The under and thinner part of the *Vagina* next the *Rectum*, cut thro' and drawn asunder.

QQ, The thickness of the membranous substance that is in the lower part of the *Vagina*.

R, The Orifice of the Urinary Passage.

SS, The *Foramina* of the *Lacuna*.

T, The *Clitoris*.

V, Considerable Nerves that go on the outside or back of the *Clitoris*.

FIG. III.

Shews the Cavity of the *Uterus*.

AA, The *Uterus* cut length-ways.

BB, The bottom of the *Uterus* cut cross, to see the passage of the *Fallopian Tube* in the Cavity of the *Uterus*.

C, The beginning of the left *Tube* as it is ordinarily streightened.

DD, The process of the *Tube* more and more dilated.

EE, The *Ligaments* of the *Testicles* cut off.

FF, The round *Ligaments* of the *Uterus* hanging down.

G, The Cavity of the *Fundus Uteri*.

H, The Cavity of the *Cervix* and its fibrous substance.

II, The internal proper Membrane of the *Uterus*.

K, The mouth of the *Uterus*.

L, The streightening of the Neck of the Womb.

FIG. IV.

Shews the *Testicle* or *Ovarium* of a Woman.

A, The *Testicle* open'd length-ways in the lower part.

BB, The *Ova* of different sizes kept within the Membranous substance of the *Testicles*.

CC, *Blood-Vessels* in the middle of the *Testicles*, as they

Come in great Numbers, from its upper part to the Eggs.

DD, The Ligament of the Testicles cut off, by which they are join'd to the *Uterus*.

FIG. V.

Shews the place that contains the Eggs in the *Ovarium* of an Ewe, or female Sheep.

A, The glandulous substance of the *Globuli* open'd.

B, The place from whence the Egg was taken out.

C, The Egg taken out of it.

FIG. VI.

The Testicle of a Rabbet, in which the *Papillæ* of the *Folliculi* are delineated as they appear the second day after Coition.

FIG. VII.

Another Testicle of the same Creature, in which the thickness and cavities of the *Folliculi* appear the third day from Coition, in which the Eggs lay hid.

FIG. VIII.

Shews the Womb open'd by an Incision of the fore-part.

AA, The parts of the *Uterus* cut a-crofs, and so order'd that its cavity and the thickness of its spongy sides may be seen.

B, The Cavity of the bottom of the *Uterus*.

C, The Cavity of the neck of the *Uterus*.

D, The streightness between the Cavities of the Bottom and Neck very conspicuous.

E, The mouth of the *Uterus*.

F, The part of the *Vagina* cleaving to the mouth of the *Uterus*.

GG, Part of the Tubes.

HH, Probes inserted by the Tubes into the Bottom of the *Uterus*.

II, The proper Membrane of the *Uterus* covering its inward substance.

KK, The interior Membrane of the neck of the *Uterus* less spongy.

T A B. XXXVI.

Fig. I. from De Graaf, the rest from Hoboken and Bidloo.

FIG. I.

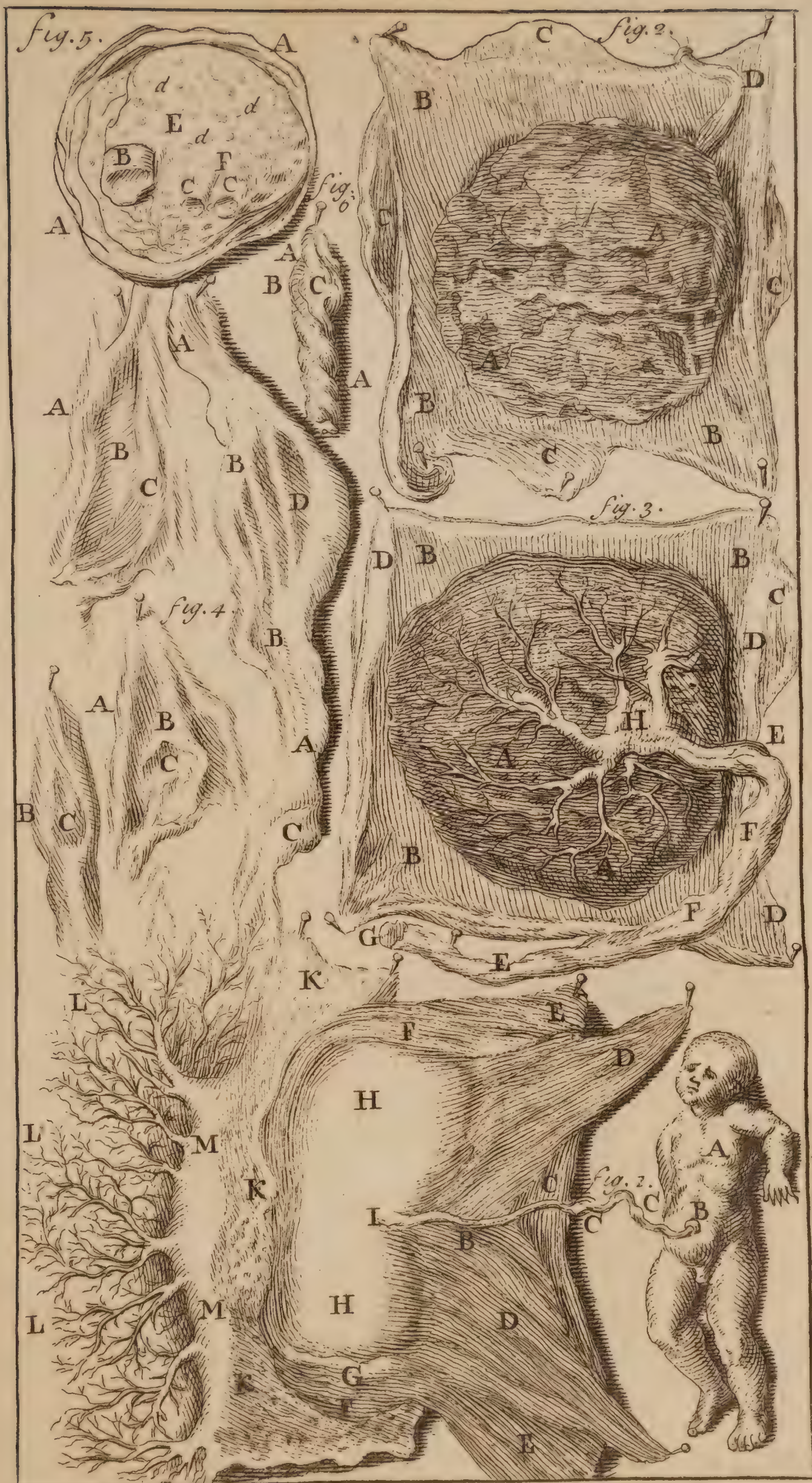
AN Abortive of three months with its secundines.
A, The *Fœtus*.

B, Its Navel.

CC, The inequalities or knots of its Navel-string.

DD, Two parts of the Membrane call'd *Ammios* expanded.

EE, Part



EE, Part of the Membrane call'd *Chorion* expanded.

FF, Part of the *Amnios* and *Chorion* sticking together.

G, Parts of *Allantois* separated from the *Amnios* and laid bare.

HH, That Part of the *Allantois* or *Urinary* Membrane blowed up, which lies under the *Amnios*.

I, The insertion of the *Navel-string* into the *Placenta*.

KK, Part of the *Placenta*.

LL, Part of the *Placenta* separated, that its Blood Vessels may be seen.

MM, The hinder part of the *Chorion*, from whence the Branches of the Vessels of the *Placenta* go like the Branches of Trees, before they insinuate themselves into the Pores of the *Uterus*.

FIG. IX.

The Surface of the *Secundines* of a *Fœtus* next the *Uterus*.

AA, The *Placenta Uterina*.

BBBB, The *Chorion*.

CCCC, The *Amnios*.

D, A part of the *Navel-string*.

FIG. III.

The Surface of the *Secundines* next the *Fœtus*.

AAA, The internal Surface of the *Placenta* next the *Fœtus*.

BBBB, The *Amnios*.

C, The *Chorion*.

D, The *Urinary* Membrane cut off.

EE, The *Navel-string*.

FF, The Knots of its Vessels.

G, That part of the *Navel-string* next the *Fœtus*.

H, A distribution of the Vessels into the *Placenta*.

FIG. IV.

AAA, Parts of the *Navel-string*.

BB, The *Arteries* with their *Knots*.

CCC, One of 'em open.

D, The *Umbilical* Vein.

FIG. V.

Shews the *Navel-string* dissected transversely, and view'd thro' a Microscope.

AA, The *Navel-string* dissected in the middle.

B, The *Umbilical* Vein.

CC, The two *Umbilical* Arteries.

dd, *Divers* Ducts containing the *Succus Nutritius*.

EE, The *Fibres*.

F, The *Urachus* between the two Arteries.

FIG. VI.

Another part of the *Navel-string*, in which its Vessels being filled with Wax, their turnings may be partly seen.

A, Part of the *Navel-string*.

B, The turnings of both *Arteries*, which have little knots on both sides.

C, The Vein that goes with the *Arteries*.

T A B. XXXVII.

From Bidloo.

FIG. I.

THE *Papilla* and *Areola* of a Woman's Breast express'd by the assistance of a *Microscope*.

A, The head or top of the *Nipple*.

B, Its Glandulous Membrane.

C, The mouths of the Milk-Vessels.

DD, The *Areola*.

E, Its rough Membrane.

FFF, Divers *Papillary* Protruberances from each of which a Hair proceeds.

GG, Some *Vestigia* of the *Lactiferous* Tubes in their progress from the *Mamma* to the *Papilla*, A, B, C.

FIG. II.

The *Papilla* itself with its Milk-vessels magnified.

AA, The external Glandulous Membrane of the *Papilla* separated from it.

BB, Divers Glands of the *Papilla* cleaving to this Membrane.

CC, The *Lactiferous* Tubes which arise from the Extremities of the Arteries within the *Mamma*, and discharge their Contents at their Orifices in the top of the *Papilla*, C, Fig. 1.

DD, The Glands of the *Papilla*, whose secretory Ducts discharge themselves into the *Lactiferous* Tubes.

FIG. III.

The back-part of the *Areola* that was divided from the Breast.

AA, The Circumference of the *Areola*.

BB, The *Mammary* Glands.

CC, The *Lactiferous* Tubes in their way to the *Nipple*,

FIG. IV.

Shews a *Hair* delineated by a *Microscope*.

AA, The *Hair* above the Skin which seems to be composed of divers horny Globular Bodies.

B, Part of the *Cuticula* which adheres to the *Hair*.

C, The root of the *Hair* within the Skin.

ddd, The *Fibrilla*, or branches which grow out of the *Hair*.

FIG. V.

A Woman's Breast dissected.

AA, The *Skin* rais'd and pinn'd out.

B, The *Skin* partly remaining on it.

C, The *Nipple* or *Papilla*.

DD, The *Areola*.

EE, The Glands of the Breast.

FF, The *Lactiferous* Tubes and Blood-Vessels in the Interstices of the Glands.

GG, The

fig. 5.

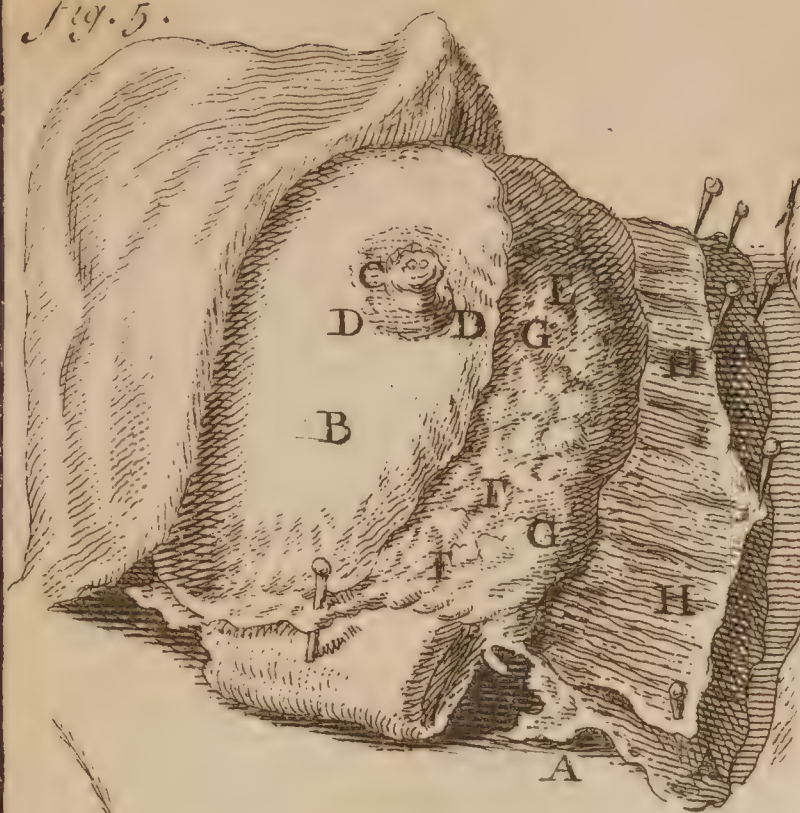


fig. 6.

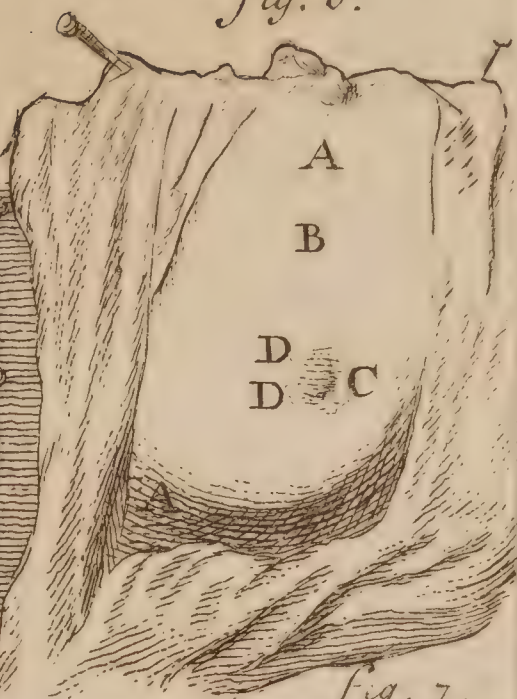


fig. 7.

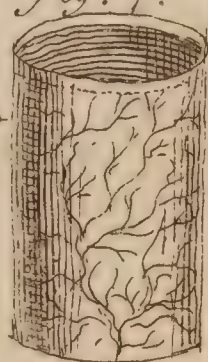


fig. 2.



fig. 4.

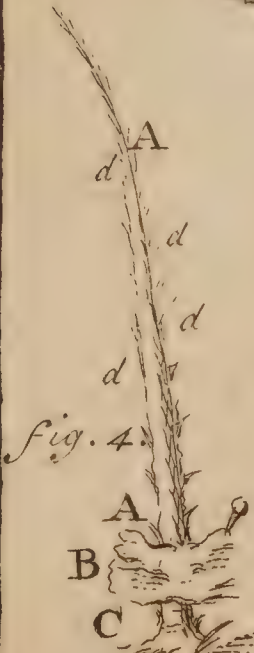


fig. 1.

fig. 3.



GG, The Adipose Ducts placed between the lactiferous Tubes.

HH, Part of the Pectoral Muscle.

B, Its Skin.

C, The Papilla.

DD, The Areola.

FIG. VII.

FIG. VI.

AA, A Hair magnify'd by a Microscope.

AA, The Mamma of a Man.

T A B. XXXVIII.

Fig. I. is Blancard's (as he says). II. from Bidloo, the rest from Dr. Willis.

FIG. I.

THE Delineation of the Cuticula by a Microscope.

AAAA, The Sweat-Pores, as they appear by a Microscope.

BBBB, The Furrows and Channels which are form'd by the Glands that lie under.

FIG. II.

The Skin view'd through a Microscope.

aaa, The Papilla composed of the four kinds of Vessels.

bbb, Capillaments of watery Vessels placed between the Papilla, says Bidloo.

dd, The Vessels of Sweat placed in the middle of three or four Papilla.

ee, The Hairs arising at the Sides of the Pores of the Sweat-Vessels, having collateral Branches.

FIG. III.

Shews the ordinary Appearance of a simple, regular Muscle, in whose Belly the carnous Fibres being opened, and separated from one another, the membranous Fibrilla may be seen.

A, The right Tendon.

B, The left opposite Tendon.

C, The fleshy Belly, whose Fibres being equal and parallel, lie between both Tendons at oblique but equal Angles.

D, The opening of the carnous Fibres, which being drawn from one another, the membranous Fibrilla that pass the cross-way appear.

FIG. IV.

Shews a simple Muscle, after the Tendon is cut off, and some part

part separated from it, and cut in the middle, that the *interior Series* of the *carnous Fibres*, and their joining with the *Tendons*, may appear.

AA, The *right Tendon* placed above, both parts of which being divided, appear.

B, The *left opposite Tendon*, which being divided, the *Fibres* only are seen upon the edge, the rest lying very much under the *Flesh*.

C, Part of the *carnous Belly* divided and separated, in which all the equal *carnous Fibres* proceed in the same oblique Order from one *Tendon* to the other.

D, Some *membranous Fibrillæ* that cross the *fleshy* ones very thick, scarce express'd in this Figure.

FIG. V.

Shews a *Muscle* not much compounded.

A, The *exterior compound Tendon* inclosing the *Flesh* on both sides, which being divided, little more than the edges of it are here seen.

B, The *interior compound Tendon* passing through the middle of the *Flesh*, which receives the *carnous Fibres*, sent from both sides of the *exterior Tendon*.

C, The *first Belly* of the *carnous Fibres*, whose *Fibres* being all equal and parallel, lie between the sides of the *Ten-*

dons that are opposite, at oblique and equal Angles.

D, The *second Belly* of the *fleshy Fibres*, which being made after the same manner with the former, go the same way with them.

EE, Both the *Extremities* of the *exterior compound Tendon*.

F, The *Extremity* of the *internal compound Tendon*.

FIG. VI.

Shews the *regular compound Muscle*, divided in the middle and opened, so that the parts of both *Bellies* may be seen within-side.

A, The *compound exterior Tendon* divided into four parts.

BB, Parts of one side of the divided *Tendon*, separated from one another.

C, Parts of the other side of the *Tendon*, likewise divided and laid by each other, which lie very much under the *Flesh*.

DD, The *Flesh* of the one *Belly* divided and separated from the other.

EE, The *Flesh* of the other *Belly* divided and laid by.

F, The *interior compound Tendon* passing through the middle of the *Flesh*.

GG, Parts of the same *Tendon* divided from one another, with the *Fibres* of that *Belly* of the *Muscle* that joins with them.

fig. 1.

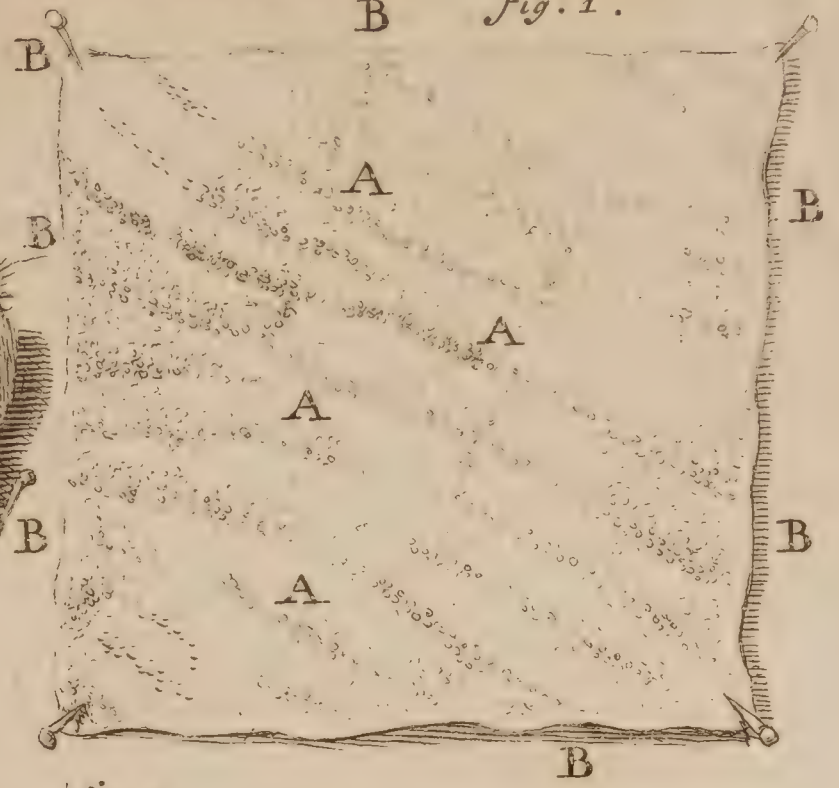


fig. 2.



fig. 3.



fig. 4.

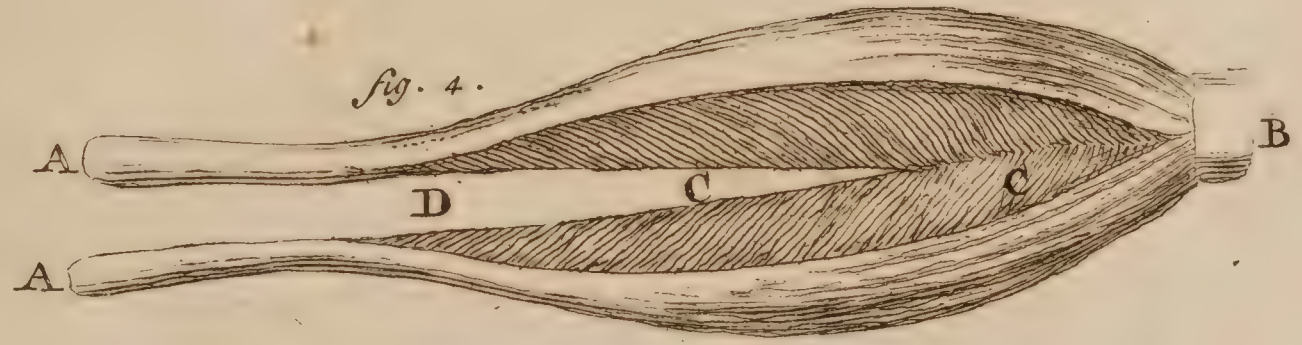


fig. 5.

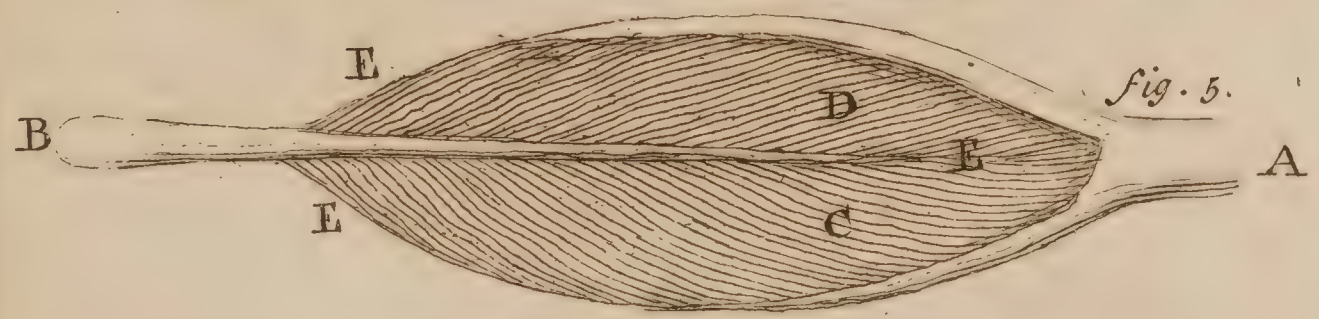
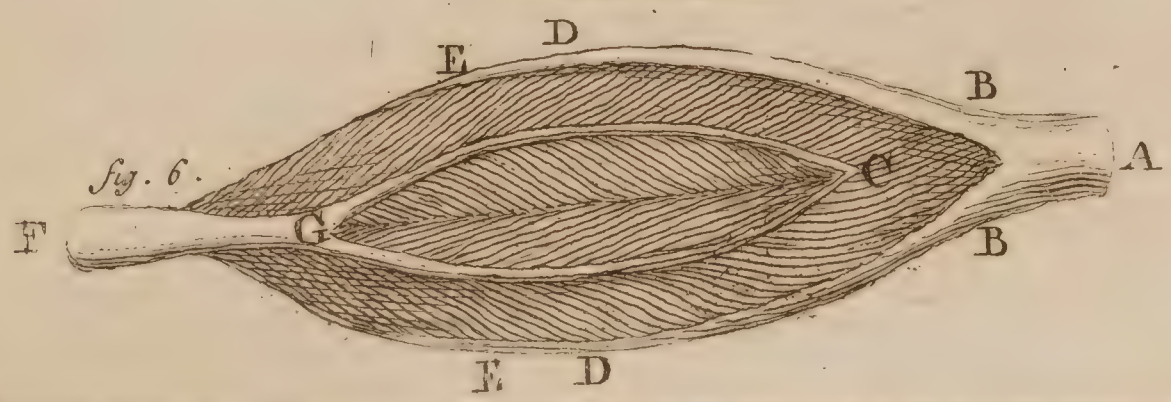


fig. 6.





T A B. XXXIX.

All from Bidloo.

FIG. I.

THE Muscles of the Lips, and some of those of the Lower Jaw, after the *Quadratus Genæ* is taken off.

N.B. *That these, and most other Figures taken from Bidloo, we shall follow the Descriptions given them by Mr. Cowper. See his Anatomy, Tab. 12.*

a, This formal appearance of circular Fibres about the *Ala Nasi* (says he) I suspect to be fictitious, having never observ'd such a disposition of them in any Subject, after purposely examining this Part; yet the like Figure of these Fibres may be seen in *Placentinus* and others.

b, A Muscle whose Position renders it capable of pulling up the *Ala Nasi*, whence 'tis call'd *Elevator Ala Nasi*, and by *Placentinus*, *Pyramidalis*, from its Figure; nor do we commonly find this Muscle in Dissection; the fleshy Fibres of this Part, frequently taking the same course with those of the *Orbicularis Palpebrarum*, do pass by the *Ala Nasi*.

c, The *Musculus elevator Labii superioris proprius*.

n, The *Orbicularis Palpebrarum*. This is a thin fleshy Muscle, circularly environing the Eye-lids, to which it is inserted not unlike the *Sphincter* Muscle

of other Parts, as of the Lips and Bladder of Urine: It acts in drawing the Eye-lids nearer each other, which we call shutting the Eye-lids. But if this Muscle acts vigorously, it not only draws the Eye-lids close together, but forces the Bulb of the Eye into the Orbit.

Note, n in this Fig. as in that of *Bidloo*, by mistake is placed on the Temporal Muscle.

o, The *Musculus Masseter in situ*.

p, Part of the *Buccinator*, cover'd with Fat.

l, The Parotid Gland, part of which being cut away to shew the *Masseter*.

k m n, The Temporal Muscle, k n its Outside, m its Inside next the Skull turn'd down.

Besides these Letters of Reference, Mr. *Cowper* adds five more, which are not taken notice of, either by *Blancard* or *Bidloo*.

FIG. II.

Exhibits the Muscles of the Lips, and some of those of the Lower Jaw.

abc, The *Musculus Buccinator*, freed from its Origin at the *Processus Coronæ* of the Lower Jaw, and left at its Insertion at the Angle of the Lips. Here we may observe, that in this Figure, as in the Life, the Fibres of

of this Muscle run according to its Length, contrary to the Description *Bidloo* and others give of it. The *Ductus Salivaris* of the Parotid Gland passes thro' this Muscle into the Mouth.

d, The *Musculus elevator Labiorum communis*.

e, The *Elevator Labii superioris proprius*, and *Musculus Dilatator Alae nasi*.

f, The *Zygomaticus*.

g, The *Depressor Labiorum communis*.

h, The *Depressor Labii inferioris proprius*.

i, The *Constrictor*, or *Sphincter Labiorum*.

k, m, The *Temporalis*.

n, The *Processus condyliformis* of the Lower-Jaw, which is in a great part laid bare.

To this Figure also divers other References are added by Mr. Cowper.

FIG. III.

Divers Muscles of the Tongue, *Os Hyoides* and *Larynx*, as they appear in their proper Situation after the Side of the Lower-Jaw is taken off.

aa b, The Tongue pinn'd up.

c, The *Styloglossus*.

d, The *Ceratoglossus*, by *Bidloo* mistaken for *Basioglossus*.

e, f, The *Genioglossus*.

g, The *Basis* of the *Os Hyoides*.

h, Part of the *Fauces*, contiguous to the Root of the Tongue, which *Bidloo* and *Blancard* erroneously call the *Musculus Ceratoglossus*.

i. Part of the *Genioglossus*.

k, The *Sternohyoideus*.

l, Part of the *Coracohyoideus*.

Note, That l (according to the Original of *Bidloo*) is here placed on different Parts of this Figure, but the lowermost belongs to the last Reference.

m, The *Musculus Stylohyoideus*.

n, The *Mylohyoideus*, left at its Insertion to the *Os Hyoides*.

o, The *Geniohyoideus in situ*.

FIG. IV.

Divers Muscles of the Lower Jaw and *Os Hyoides in situ*, after the Skin, with the *Musculus Quadratus Colli*, are removed.

a, b, c, The *Musculus Digastricus*; b, its fleshy Origin from the *Processus Mammillaris*; c, its middle Tendon passing through the *Musculus Stylohyoideus*, and an annular Ligament fastned to the *Hyoid*, before it is implanted in the Lower-Jaw, dd.

dd, The under part of the Lower Jaw-bone next the Chin,

ee, The *Mylohyoideus*.

ff, The *Sternohyoidei*.

gg, Parts of the *Coracohyoidei*.

hh, Parts of the *Sternohyoidei*.

H, The *Mastoideus*.

For the rest of the Parts of this Figure, we must refer to Mr. Cowper's Explication, the most significant not being letter'd by *Bidloo* or *Blancard*.

FIG. V.

Divers Muscles lying under those express'd in the preceding Figure.

aa, The

fig. 4.



fig. 5.



fig. 6.



fig. 3.



fig. 7.

fig. 8.

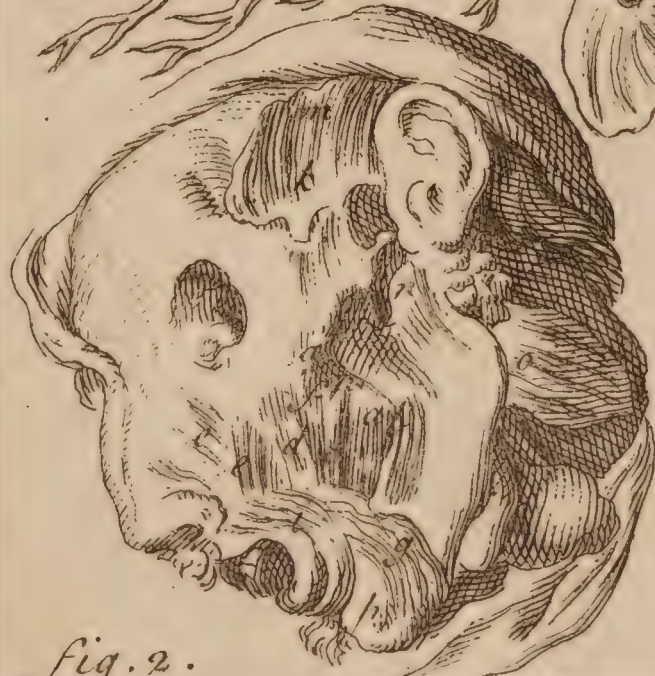


fig. 2.



fig. 1.

aa, The lower edge of the inferior Jaw-bone bared.

bb, Parts of the *Musculi Sternohyoidei* hanging down from their Originals.

c, The *Coracohyoideus*.

d, Part of the *Musculus Stylohyoideus*, at its Termination in the *Os Hyoides*.

e, The *Glandula sublingualis* lying immediately under the *Musculus Mylohyoideus*.

f, The *Geniohyoideus*.

gg, The Digastrick Muscles of the Lower Jaw cut from their Insertions.

hh, The *Musculi Mastoidei*, that of the right Side remaining *in situ*; the left being cut off from its Original.

i, The scutiform Cartilage of the *Larynx*, which makes what is called the *Pomum Adami*.

k, The Wind-pipe.

ll, The *Glandula Thyroidea*.

There are no less than ten considerable Parts not taken notice of in this Figure, either by *Bidloo* or *Blancard*; of which you may see an Account of in Mr. *Cowper's* Explications, Tab. 15.

FIG. VI.

The Ramifications of the *Ductus Salivalis* injected with Wax, and freed from the Parotid Gland.

a, The Trunk cut off as it passes over the *Musculus Masseter*.

b, c, d, e, f, The Ramifications of the Salival Duct freed from the Gland.

FIG. VII.

A, The *Musculus Attollens Auriculam*.

B, CC, The *Retrahens Auriculam*.

aa, The external Margin of the outward Ear, call'd *Helix* and *Capreolus*.

BB, The *Anthelix Auriculæ*.

D, The *Tragus Auriculæ*, below which is the *Labus*.

DD, Below the upper D, shews part of the parotid Gland.

EE, The Ramifications of its excretory Ducts.

G, The Trunk of its excretory or salival Duct cut off.

FIG. VIII.

Represents, according to *Bidloo*, the Salival Ducts freed from the inferior Maxillary Gland, express'd *in situ* in Fig. 4. of this Table, but not letter'd nor taken any notice of by either of these Writers. This Figure, like some others published by *Bidloc*, was done from Invention, and is censur'd in Mr. *Cowper's* Explications; however, he adds *Bidloo's* Account of it as follows.

A, The Twigs of the Salival Ducts injected with Wax, and freed from the Glandules; B, the larger Branches; C, their common Duct; D, its Orifice enclos'd with an edging; E, part of the investing Membrane of the Mouth cut off. See Fig. 19. of Mr. *Cowper's* Appendix.

T A B. XL.

From Bidloo.

FIG. I.

SHews divers Muscles employ'd in the Motion of the Head, after the upper part of the *Circularis* is remov'd.

a, b, d, The *Musculus Splenius* in situ on the left side.

e, The *Splenius* rais'd to shew

f, g, h, The *Complexus*.

ii, The *Os Occipitis*.

FIG. II.

The Muscles which appear under the former.

a, The *Rectus major posticus*, hanging down.

b, The same in situ.

cc, The *Os Occipitis*.

e, The *Recti minoris* lying under the *maiores*.

f, The *Obliquus inferior*.

g, The *Obliquus superior*.

h, The same turn'd off from the other side.

i, The *Complexus* rais'd.

m, n, The *Spinales Colli*.

FIG. III.

Divers Muscles of the Head and Neck, which appear in the fore-part, after the Lower-Jaw, Tongue, *Larynx*, *Aspera Arteria*, and *Gula*, are removed.

aa, The *Musculi Longi colli*.

bb, The three *Scaleni* in situ.

i, The *Mastoidens* in situ.

l, The same rais'd from its Originals.

kk, Its several beginnings.

l, The *Flexores Capitis* in situ.

See the Original in Bidloo.

FIG. IV.

Divers Muscles that appear in the superior and fore-part of the Trunk.

a, The *Sternum*.

b, The *Musculus subclavius*.

c, The Cartilaginous ending of the first Rib.

dd, The *Serratus major Anticus*.

ee, Its Indentations with the *Obliquus descendens*.

ff, The *Serratus major Anticus* rais'd.

g, The *Obliquus descendens*.

h, The *Pectoralis*.

i, The same rais'd.

k, The *Serratus minor Anticus* rais'd.

The rest of the Muscles express'd in these Figures, cannot be referred to for want of Characters placed on them in the Prints, all which are supplied by Mr. Cowper, in his *Explications*.

fig. 4.



fig. 3.



fig. 2.



fig. 1.





T A B. XLI.

From Bidloo.

FIG. I.

aa, **T**HE *Trapezius* or *Cu-*
collaris on both sides.

bb, c, dd, f, g, The several
Orders of its Fibres, as expres-
sed in the Figure.

ii, The *latissimus dorsi*, or *A-*
niscalptor in situ.

ll, Part of the *Obliquus descen-*
dens on both sides.

m, The *Infraspinatus*.

h, n, The *basis* of the *Scapula*.

oo, The Tendon of the *La-*
tissimus dorsi.

FIG. II.

a, The *Rhomboides in situ*.

b, c, Its Origin.

d, Its Termination.

e, The same separated.

f, i, The *Serratus superior po-*
sticus.

g, Part of the *levator scapula*.

h, Its ending.

k, The *serratus posticus infe-*
rior.

l, The *Deltoides*.

m, The *Aniscalptor*.

n, The *Sacrolumbus*.

o, The *longissimus dorsi*.

p, The *Semispinatus*.

q, r, The *Sacer*.

FIG. III.

a, The *Sacrolumbus*.

b, The *Longissimus dorsi*.

c, The *Semispinatus*.

FIG. IV.

a, The *Sacer*.

b, The *Quadratus Lumborum*.

c, The *Sacrolumbus*.

d, The *Longissimus dorsi*.

e, The *Semispinatus*.

f, The Ribs.

FIG. V.

aa, The *obliquus descendens* of
the *Abdomen* out of its proper
place.

bbb, Its first Connexion.

cc, Its second and third from
the Spines of the *Os Ilion*.

ee, The ending of its Fibres.

ff, Its Tendon cut off about
the *linea Alba*.

g, Its membranous and ten-
dinous insertion into the *Os pu-*
bis.

h, The Ribs that appear.

i, The *obliquus ascendens*.

k, Its ascending Fibres.

ll, m, n, The *Rectus* in its
place.

oooo, Its tendinous Sections.

pp, The other *Rectus* remov'd
out of its proper place.

qq, The

qq, The *Musculi Pyramidales*.
 r, The *Transversalis*.
 ss, Its Tendon cut off.
 ttt, The Intestines appearing
 under the *Peritoneum*.
 vv, The Mammary and Hy-
 pogastrick Veins and Arteries.

FIG. VI.

Shews the Cavity of the *Ab-
 domen*, after its *Viscera* are taken
 out.

aaaa, The Muscles of the *Ab-
 domen* cut off.

bb, The Diaphragm, in its
 natural situation, as it appears
 next the *Abdomen*.

c, The Foramen, thro' which
 the *Vena cava* goes to the Heart.

d, The Foramen, thro' which
 the *Æsophagus* passes:

e, The Trunk of the great
 Artery cut off, passing thro' the
 Foramen of the Diaphragm.

f, Part of the upper Muscle
 of the Diaphragm.

g, Part of the lower Muscle
 of the Diaphragm.

h, Its two Tendons on the
Vertebræ of the Loyns.

i, The *Vertebræ* of the Loyns.

kk, The *Psoas*, or *Musculus
 lumbaris*.

ll, The same, partly separated
 from the *Vertebræ*, and pin'd out.

m, The *Quadratus*.

n, The *Iliacus internus*.

o, The *Pectineus*, which is
 call'd *Lividus*.

pp, The *Triceps*.

T A B. XLII.

From Bidloo.

FIG. I.

aaa, **T**HE Skin freed from
 the Muscles.

b, The internal Tubercle of
 the *Os Humeri*.

c, The tendinous expansion
 of the *Pulmaris longus*.

d, The *Biceps*.

e, The *Pronator Radii Teres*,
 obscurely exprest.

f, g, The long Tendon of the
Palmaris.

h, k, The transverse Liga-
 ment of the *Carpus*.

i, The *Abductor pollicis*.

l, The Thumb.

m, n, o, p, The four Fingers.

FIG. II.

a, c, The *Musculus Deltoides*,
 rais'd from its Original.

b, The *Clavicula*.

d, The *Pectoralis*.

e, The *Subscapularis*.

f, The *Coracobrachialis*.

g, The *Biceps*.

h, The *Rotundus major*.

FIG.

TAB. XLII.

fig. 1.



fig. 2.



fig. 3.



fig. 4.



fig. 5.



fig. 6.



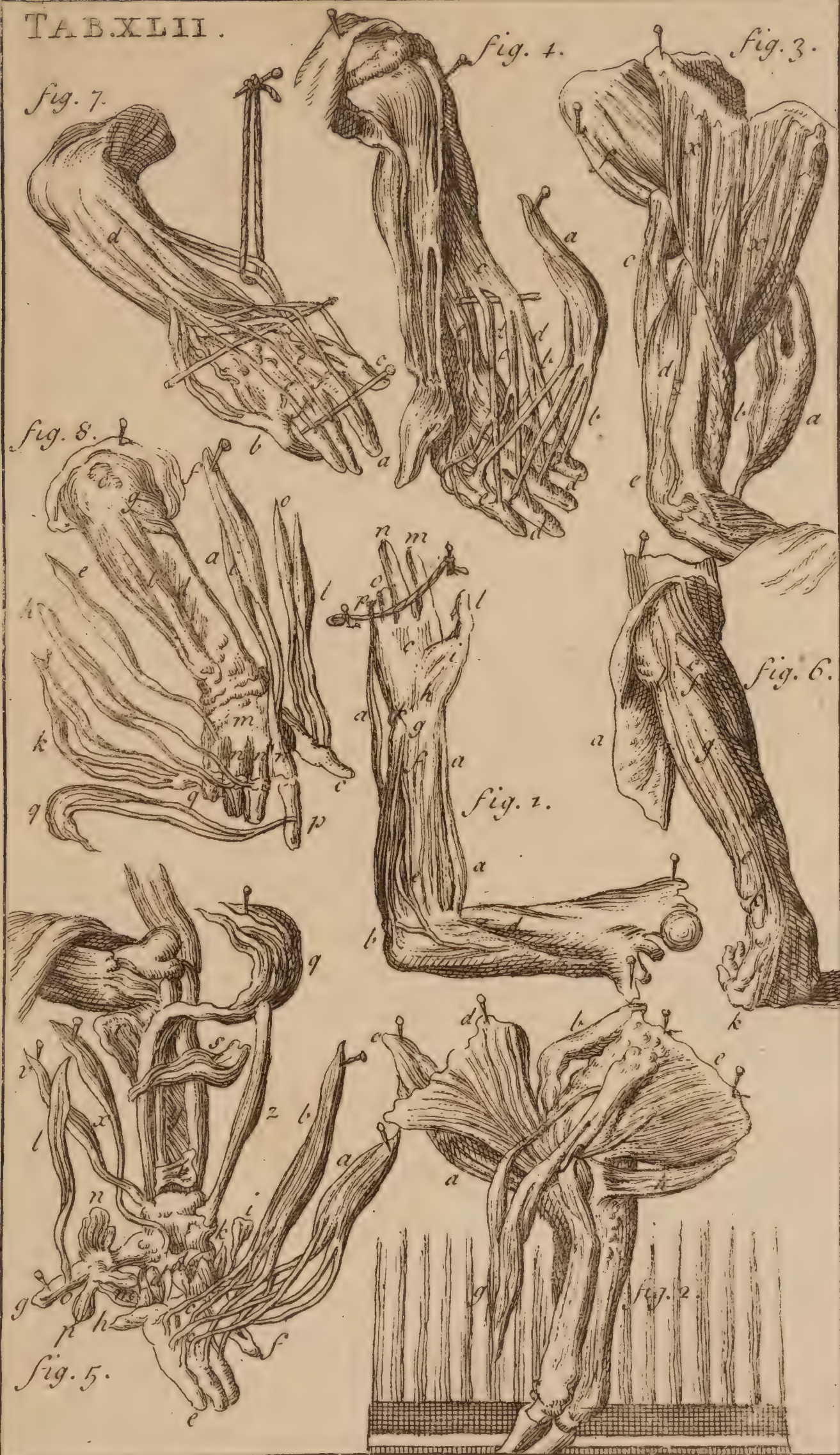


FIG. III.

- a, The *Biceps* drawn off its subjacent Muscles.
b, The *Brachialis internus*.
cde, The *Gemellus*.
f, The *Rotundus major*.
g, The *Supraspinatus*.
xx, The *Deltoides*.

FIG. IV.

- a, The *Perforatus*.
b, Its Tendons.
c, The *Perforans*.
ddd, Its four Tendons which pass through the Fissures (ee) of those of the former Muscle.
ee, The Cases in which they are all inclosed.
ff, The *Lumbricales*.

FIG. V.

- a, The *Perforatus*.
b, The *Perforans*.
ccc, The *Lumbricales*.
dd, The *Interossei*.
e, The Fore-Finger.
f, The Little-Finger.
g, The Thumb.
h, The *Abductor Indicis*.
ik, The *Abductor minimi digiti*.
l, *Flexor pollicis longus*.
pmo, *Flexor primi & secundi Ossis pollicis*.
n, The *Abductor*, and part of the *Flexor secundi internodii Pollicis* rais'd together.

Thus far *Blancard*; Here is a Specimen of his Skill in *Anatomy*; his Master *Bidloo* could not go any farther with the Explanation of this Figure than as

above: But the Graver seeing other things express'd in the Figure as remarkable as those that were letter'd, thought he should put Letters on the rest too; which when he had done, *Blancard* could give no more account of, than *Bidloo* had done before him; which are as follows.

- q, The *Biceps*.
r, The *Supinator Radii brevis*.
s, The *Pronator Radii teres*.
t, The *Pronator Radii quadratus*.
v, The *Supinator Radii longus*.
x, The *Flexor Carpi Radialis*.
y, The Ligament between the *Ulna* and *Radius*.
z, The *Ulnaris Carpi Flexor*.

FIG. VI.

- a, The Skin separated and hanging by.
b, The Elbow or *Olecranon*, by *Bidloo* and *Blancard* call'd the External *Apophysis* of the *Os Humeri*, and
c, Placed on the *Extensor Carpi radialis*, which they call the Internal *Apophysis* of the *Os Humeri*.
fd, Is also placed on the same *Extensor Carpi radialis*.
g, The *Extensor digitorum communis*.
e, The *Extensor Carpi Ulnaris*.
kk, i, Are placed confusedly in this Figure.

FIG. VII.

- a, The Fore-Finger.
b, The Little-Finger.
c, The Thumb.
d, The *Extensor digitorum communis*.
ee, f, Its Tendons passing to the

the first and second Bones of the Fingers here supported.

N. B. The *Radialis extensor* is supported with a String.

FIG. VIII.

- a, The *Radius*.
- b, The *Ulna*.
- c, The upper End of the *Radius*.
- d, The Ligament joining the *Ulna* and *Radius*.
- e, The *Musculus Ulnaris extensor*.

- f, i, The *Radialis extensor*.
- g, The *Supinator Radii brevis*.
- hh, Part of the *Extensor communis digitorum*.
- k, The *Extensor minimi digiti proprius*, express'd three times bigger than it ought.
- m, The *Carpus*.
- nnnn, The Bones of the *Metacarpus*.
- l, o, The *Extensores primi, secundi & tertii Internodii pollicis*.
- qq, Part of the *Extensor communis digitorum*, together with the *Indicator*.

T A B. XLIII.

From Bidloo.

FIG. I.

- a, **T**HE *Gluteus major* rais'd.
- b, The Inequalities of its Fibres.
- c, Its Implantation into the *Trochanter*.
- d, The *Gluteus medius*.
- e, The *Trochanter major*, in which the *Gluteus medius* is implanted.
- f, A Ligament between the *Os sacrum* and *Ischium*.
- g, The Knob of the *Ischium*.

FIG. II.

- a, The *Gluteus major* rais'd.
- b, The *Medius* also rais'd.

- c, The *Minor*.
- d, g, i, The *Iliacus externus*, or *Pyriformis* rais'd.
- e, The end of the *Os sacrum*.
- h, Part of the *Marsupialis*.

FIG. III.

- b, The *Gluteus Medius*.
- c, The *Minor*.
- d, The *Iliacus externus*, or *Pyriformis* rais'd.
- e, Part of the *Vastus externus*.
- f, The *Marsupialis*.
- g, Its *Marsupium*.
- i, The head of the Thigh-bone.
- k, The *Os Ilion*.
- l, The *Os Sacrum*.
- m, The *Os Ischium*.

FIG.

fig. 3.



TAB. XLIII.

fig. 2.



fig. 8.



fig. 6.



fig. 1.

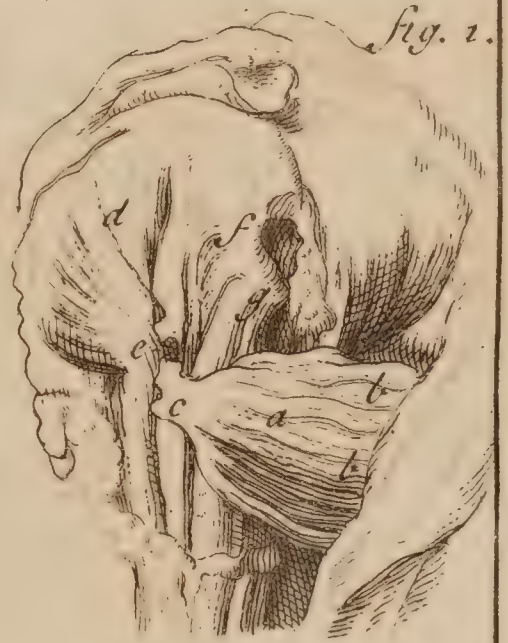


fig. 5.



fig. 4.



fig. 7.





FIG. IV.

- a, The *Sartorius longus*.
- b, Its Origin from the Tubercle of the *Os Ilion*.
- c, Its insertion into the *Tibia*.
- d, The *Gracilis*.
- e, Its beginning from the *Os pubis*.
- f, Its ending in the *Tibia*.
- g, The *Rectus*.
- h, The *Vastus internus*.
- i, The *Vastus externus*.

FIG. V.

- a, The *Musculus membranofus*.
- b, Its broad Tendon, inclosing all the Muscles of the Thigh.
- c, The *Musculus crureus*.
- d, The *Sartorius longus* hanging down, with
- e, The *Gracilis*, and
- f, The *Rectus*, and
- g, The *Vastus internus*, and
- h, The *Vastus externus*.
- i, The *Triceps*.

k, The *Psoas*, or part of the *Musculus Lumbaris*.

FIG. VI.

- a, The *Biceps*.
- b, Its two Heads.
- c, Its ending.
- d, The *Semimembranofus*.
- e, The *Seminervofus*.
- f, The *Gluteus magnus*.
- g, The *Medius*.
- h, The back-part of the Thigh-bone.

FIG. VII.

- a, The *Gluteus major*.
- b, The *Biceps*.
- c, The *Semimembranofus*.
- d, The *Seminervofus*.
- e, The Thigh bone bared.
- f, Parts of the Muscles of the *Tibia*.

FIG. VIII.

- aa, The Thigh-bone laid bare.
- b, The *Musculus crureus*.
- c, The *Patella*.
- d, Its inclosure.

T A B. XLIV.

From Bidloo.

FIG. I.

- a, **T**HE *Patella*.
- b, The Tendons of the *Musculi Peronei*.
- c, The *Malleolus externus*.
- d, The *Tibialis Anticus*.
- e, The *Peroneus longus*.
- f, The *Extensor digitorum pedis longus*.

- g, The Tendons on the top of the Foot.
- h, Part of the Tendon of the *Extensor pollicis*.
- i, Part of the *Gastrocnemius externus*.

FIG. II.

- a, The superior Apophysis of the *Tibia*.
- f a
- b, The

- b, The upper *Appendix* of the *Fibula*.
 c, The Body of the *Tibia*.
 d, The Heel.
 e, The *Musculus Tibialis Anticus*.
 f, The *Extensor digitorum longus*.
 g, The *Extensor brevis*.
 h, The *Extensor pollicis pedis longus*.
 i, *Peroneus longus in situ*.
 k, The Skin of the Bottom of the Foot.
 l, The *Stilus*, which supports the Tendons on the Foot.

FIG. III.

- a, The *Tibialis Anticus*
 c, The *Peroneus secundus*, or *Semifibulaus*
 b, The *Peroneus primus*, or *Fibulaus*
 d, The *Extensor digitorum pedis longus*
 e, Its Tendons near their Insertions
 f, *Extensor digitorum pedis brevis*
 g, *Extensor pollicis longus*
 m, *Extensor brevis*
 h, The *Tibia*.
 i, The *Fibula*.
 k, The Bones of the *Tarsus*.
 ll, The *Musculi interossei*.
 o, Part of the *Gastrocnemius internus*.
- rais'd and left at their Insertions.

FIG. IV.

- a, The upper part of the *Tibia*.
 b, Its middle.
 c, The Heel.

- d, Part of the *Musculus Popliteus* at its insertion.
 ee, The *Gastrocnemius externus*.
 f, The Tendinous Expansion of the *Musculus Plantaris*, freed from the bottom of the Foot and expanded; but here express'd too large.
 g, The *Musculus Perforatus*, and Tendons of the *Perforans* on the bottom of the Foot.
 h, The little Toe.
 i, The great Toe.

FIG. V.

- aa, Two Protuberances of the inferior *Appendix* of the Thigh-bone.
 b, The upper part of the *Tibia*.
 c, The *Musculus Popliteus*.
 d, The fore part of the Shin-bone.
 ee, Parts of the *Gastrocnemius externus*.
 f, The inside of the *Gastrocnemius internus*.
 g, The *Plantaris* left at its Original: This long slender Tendon here express'd, is placed between the External and Internal *Gastrocnemii*.
 h, A large Nerve in its way to the bottom of the Foot.
 i k, The *Flexor Pollicis longus in situ*.

FIG. VI.

- a, The Knee.
 b, The Shin-bone or *Tibia*.
 c, The *Fibula*.
 dd, The beginnings of the *Gastrocnemius externus* dissected.
 e, Its

TABXLIV.





e, Its conjunction with the *Internus*.

ff, The *Musculus Plantaris* dissected.

g, The *Tibialis posticus* dissected.

h, The *Perforans* dissected.

i, The *Perforatus in situ*.

k, The *Flexor pollicis longus* dissected.

FIG. VII.

aa, The Tendons of the *Perforans*, before they pass the Fissures of those of the *Perforatus*.

bc, *Musculus communis Lumbricalium pedis longus*, commonly call'd *Cornea Massa*.

def, Part of the *Flexor pollicis longus*.

g, Part of the *Abductor pollicis*.

h, The *Os Calcis*.

i, Part of the *Musculus Perforans*.

k, The *Perforatus* rais'd.

FIG. VIII.

a, The *Musculi Interossei*.

b, *Abductor minimi digiti*.

cc, Part of the *Abductor pollicis*, and *Flexor pollicis brevis*.

d, *Adductor pollicis*.

e, *Transversalis pedis*.

f, The *Os Calcis*.

FIG. IX.

aa, The *Interossei*.

bc, Divers Muscles of the great Toe confusedly dispos'd.

d, *Abductor minimi digiti*.

T A B. XLV.

Fig. I. From Bartholin, the rest from Steno and Bourdon.

FIG. I.

Divers Muscles that appear on the fore-part of the Body, after others are taken off.

AA, *Musculi longi colli*.

B, *Musculus scalenus*.

C, *Mastoides*.

dd, The Bodies of the *Vertebra* of the Neck.

D, *Cucullaris pars*.

ee, *Clavicula*.

f, *Sternum*.

g, *Acromion scapulae*.

E, *Musculus subclavius*.

F, *Pectoralis*.

G, *Deltoides*.

H, *Biceps*.

I, *Perforatus* hanging down.

K, *Perforans*.

O, *Serratus minor anticus*.

PP, *Serratus major*.

QQ, *Intercostal Muscles*.

RRR, *Brachieus*, seen in both Arms under the *Biceps*.

SS, Part of the *Gemellus*.

TT, *Musculus radii pronator rotundus*.

V, *Radii pronator quadratus*.

W, *Supinator radii longus*.

X, *Carpi flexor externus*.

Y, *Musculus palmaris*.

Z, *Flexor carpi internus*.

f 3

h, Ra-

b, *Radius*.

i, *Cubitus*.

K, The Ligament joining the *Radius* to the *Cubitus*.

a a a, *Musculi lumbricales*.

b, *Flexor pollicis*.

cc, *Abductor pollicis*.

The following Characters are placed on the Parts that are below the Loins.

A, *Musculus Psoas*, or *lumbaris*.

B, *Iliacus internus*.

C, *Obturator internus*.

D, *Triceps*.

E, *Lividus*.

FF, *Musculus rectus* in its proper place, but hanging on the left side from its end.

GG, *Vastus internus*.

H, *Vastus externus*, which being separated, hangs down on the left side.

II, *Membranofus*, or *Fascia lata*.

K, *Cruveus*.

L, *Fascialis longus*, or *Sartorius*.

M, *Gracilis*.

N, *Tibialis anticus*.

O, *Peroneus biceps*.

P, The Muscle that extends the four Toes.

Q, *Extensor Pollicis*.

R, *Gastrocnemius*.

rrr, *Musculi interossei*.

S, The Ligament that goes across the Foot, call'd *Anulare*.

T, *Tibia*.

V, *Fibula*.

X, *Patella*.

FIG. II.

The single Fibre of a Muscle.

AA, Its fleshy Part.

BC, BC, Its two tendinous Extremes making obtuse Angles with its fleshy Part.

FIG. III.

Many such Fibres as represented in the preceding Figure, which together frame an oblique angled Parallelogram.

AB, The Orders of the fleshy Fibres.

CDFG, } Their Tendinous
HIKE, } Extremities.

FIG. IV.

The Fibres of a Muscle, framing a simple Parallelopiped Figure.

ABCDEFG, The Carnous Part.

HIKL, The Tendinous Part.

FIG. V.

The Disposition of the Fibres of the *Musculus Deltoides*, said to be compos'd of 12 simple Muscles, as represented by *Steno*.

AA, The upper part of the *Deltoides*, towards the top of the Shoulder.

aa, And the six superior Tendons from which 12 Muscles arise, and are fixt to the *Humerus*.

bbb, The 12 Muscles.

cc, Their two Tendons fix'd to the *Os Humeri*.

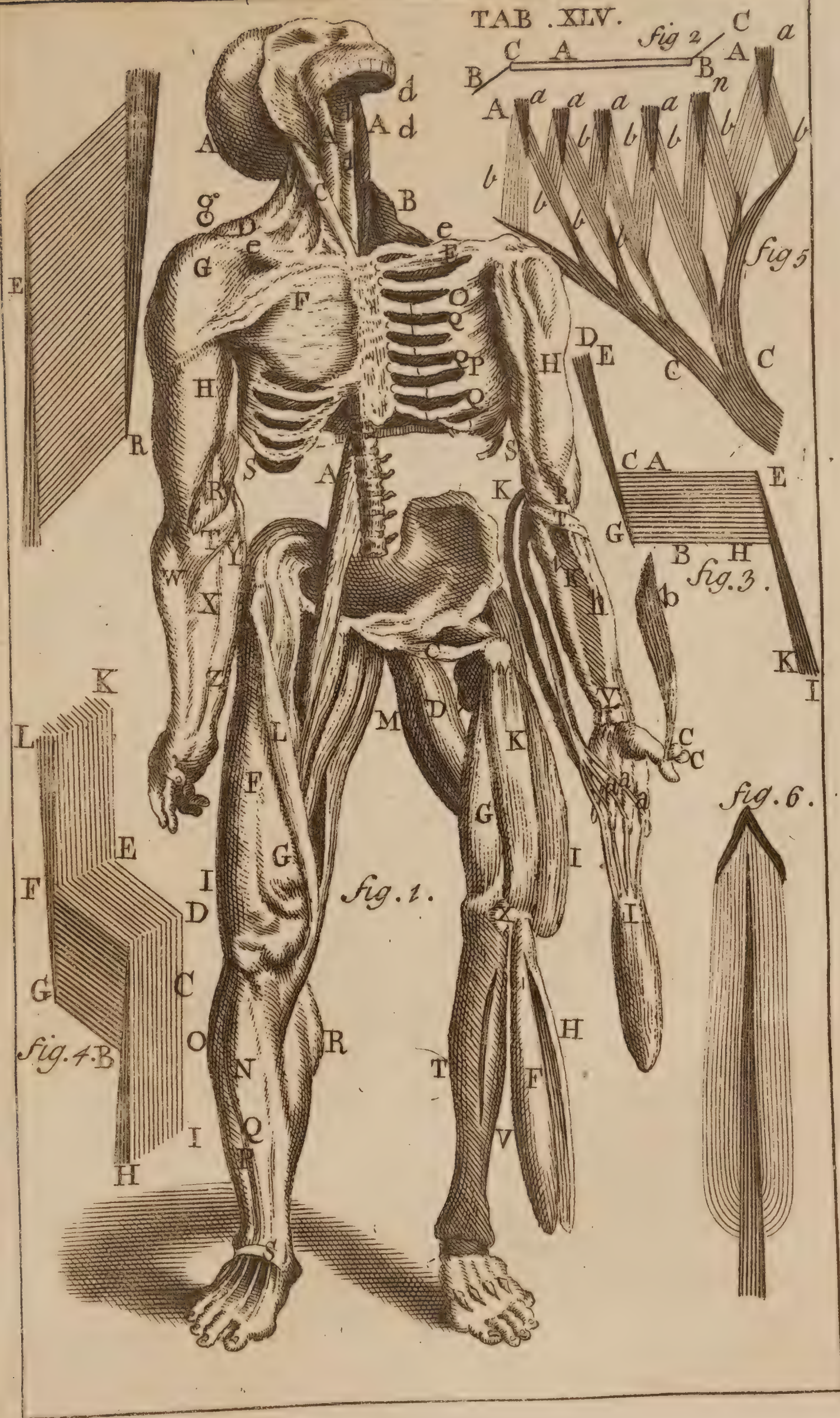
FIG. VI.

The Order of the Fibres of the *Musculus biceps Humeri*.

FIG. VII.

The Order of the Fibres of the *Musculus Semimembranosus*.

T A B.



T A B. XLVI.

Fig. 1. From Tho. Bartholin. 2. From Casper Bartholin.

F I G. I.

aa, **P** Arts of the *Musculi complexi* of the Head seen.

BB, *Splenii*.

CC, *Levata scapulae* on both sides.

D, *Trapezius*, or *Cucullaris* rais'd.

E, *Supraspinatus*.

F, *Infraspinatus*.

G, *Rotundus major*.

H, *Rotundus minor*.

I, *Rhomboides*.

K, The broadest Muscle of the Back, call'd *Latissimus dorsi*.

L, *Serratus posticus superior*.

M, *Serratus posticus inferior*.

N, The longest Muscle of the Back, call'd *Longissimus dorsi*.

O, *Sacrolumbus*.

P, *Quadratus lumborum*.

Q, *Musculus sacer*.

R S, *Gemellus*, or *Biceps externus*.

T, *Supinator Radii longus*.

V, *Extensor carpi Radialis*, hanging down.

W, The other *Extensor carpi*.

X, The two *Extensors* of the Fingers.

The External *Apophysis* of the Shoulder, at Z in Bartholin's Figure.

b, *Musculus Deltoides*.

The following Characters show the Muscles of the lower Limbs.

A, *Gluteus major* out of its proper place.

B, *Gluteus medius* in its proper place.

C, The *Pyramidal* Muscle.

D, *Obturator internus*, or *Mar-supialis*.

EE, *Biceps* bending the *Tibia*.

g, *Musculus semimembranosus*.

F, *Seminervosus*.

h, *Gracilis*.

i, *Triceps* in the left side.

K, *Vastus externus*.

L, *Triceps* in the right side.

M, *Popliteus*.

NN, *Gastrocnemii*, which in the Right Leg are in their proper situation, but hang down in the Left.

OO, *Soleus Musculus*.

P, *Plantaris*.

F I G. II.

The *Diaphragm* revers'd in this Print.

AA, *Musculus superior*.

BB, *Inferior*.

C, The *Membranous Tendon* of the upper Muscle.

ddd, The *Tendons* of the lower Muscle.

E, The *Perforation* for the *Vena Cava*.

F, The *Division* in which the descending Trunk of the *Arteria magna* passes.

G, The *Perforation* in the middle of the lower Muscle for the *Oesophagus*.

T A B. XLVII.

Fig. I. From Tho. Bartholin, the rest from Ant. Nucke.

FIG. I.

THE Muscles which are placed by, or under those express'd in the first Figure of the preceding Table.

aa, Which should have been placed a little lower, as in the Original, to shew the *Musculi Recti minores*.

bb, *Recti majores*.

CC, *Obliqui superiores*.

DD, *Obliqui inferiores*.

E, *Levator scapulae*.

F, The *Scapula* bared.

G, *Rotundus major*.

HH, *Transversales colli*.

II, The two *Spinati*.

K, *Sacrolumbus*.

L, *Longissimus dorsi*.

M, *Sacrolumbus* dissected.

N, *Semispinatus*.

OO, *Musculus sacer*.

P, *Quadratus lumborum*.

Q, *Supinator Radii brevis*.

R, *Extensor carpi radialis*.

S, *Extensor carpi ulnaris*.

TT, *Extensor digitorum communis*.

V, *Indicis extensor*.

XX, *Extensores pollicis*.

The following Characters are placed on the lower Limbs.

A, *Gluteus medius* hanging down.

B, *Gluteus minimus in situ*.

C, The same rais'd.

DD, *Pyriformis* on both sides.

E, *Marsupialis*.

F, The same rais'd on the other side where the Letter

G, Its *Marsupium*.

H, *Obturator externus*.

IK, *Quadragemini*.

LL, *Biceps*.

M, *Semimembranosus*.

N, *Seminervosus*.

O, *Gracilis*.

P, Part of the *Triceps*.

Q, *Vastus externus*.

R, *Tibialis posticus*.

S, *Flexor digitorum perforans*, rais'd and left at its two Extremes.

T, *Flexor digitorum perforatus*.

V, *Flexor pollicis*.

See the Original for the following References.

z, *Carnea Massa in planta pedis*.

x, *Abductor minimi digiti*.

b, *Pollicis adductor*.

u, *Flexor pollicis brevis*.

s, The long Tendon of the *Flexor pollicis*.

FIG. II.

The Salival Ducts of a Dog.

A, The Salival Duct, discovered by Nucke in Dogs, as it arises from a Gland placed in the Orbit of the Eye, and empties itself into the Mouth G.

B, The Salival Duct coming from the *Parotid* Gland, and emptying itself in the Mouth at F.

E, The



fig. 2 .



- E, The *Parotid* Gland.
F, The inside of the Cheek.
D, The outside.

FIG. III.

The *Salival* Gland, taken out of the *Orbit* of the Eye, with the Eye itself.

- A, The Body of the Gland.
B, Its *Ductus*.
C, The Bulb of the Eye, near which the Gland is placed.

FIG. IV.

- A, The same *Salival* Gland

as in the preceding Figure.

- B, Its *Excretory Salival Duct*.
CCC, Its Ramifications on the Surface of the Gland.

FIG. V.

The *Artery* and *Salival Duct* of the *Parotid* Gland of a Dog.

- A, The *Trunk* of an *Artery* arising from the *Carotid*.
bbb, Its *Branches*.
C, The *Ductus salivalis*.
ddd, Its *Branches*.

T A B. XLVIII.

From Keckringius.

FIG. I.

SHews a *Fœtus* of two Months old, and the chief beginnings of the *Offification* in it; which is more clearly shown in a Figure somewhat larger.

A, The whole Head, being cartilaginous.

b, Shews the rude beginning of the *Offification* of the 3^d pair of *Bones* of the upper *Jaw*.

B, The lower *Jaw*, being Bony, divided in the middle.

CC, The two *Clavicles*, which of all the *Bones* are first framed.

dddd, The tops and bottoms of the *Ribs*, being cartilaginous, when the others are Bony.

EE, The *Hand*, being carti-

laginous, divided into five Orders of *Fingers*, in which the beginnings of the *Offifications* appear like small Points.

FF, A *Cartilage* of the *Os innominatum*, in which the two Points of the *Offification* of the Bone call'd *Ilion* appear.

GG, The greater *Focil*, without any mark of a *Cartilage*, or *Bones* of the lesser *Focil*.

HH, The *Feet*, like the *Hands*, wholly cartilaginous.

FIG. II.

Shews a *Fœtus* of five Months old.

A, The *Fontanella*.

B, The *Suture* dividing the *Os frontis*.

CC, The

CC, The *cartilaginous Center* of the *Os frontis*.

D, The *Division* of the lower Jaw.

dd, The *Sockets* of the Teeth.

EE, Shews the *greater Joints* to be *cartilaginous*, the *lesser* appear in the Hands and Feet by their blackness.

F, The little *Offications* of the *Sternum*.

GG, A *Cartilage* encompassing the *Os Ilium*.

HH, The Bone call'd *Ilium* separated from the two other Bones of the *Os innominatum*.

ii, The *Os Pubis* separated from the other two.

kk, The *Os coxendicis* separated from the *Os Pubis* and *Ilium*.

LL, The great *Foramina* in the *Ossa Pubis* and *Coxendicis*.

MM, The *cartilaginous Patella*.

NN, Bony Specks appearing in the great Toes, with the rest of the Toes.

FIG. III.

Shews the *Os Spænoïdes* in a *Fœtus* of five Months old united.

A, The greater *Cartilage* about the *Sella equina*.

bb, The Holes thro' which the *Optic Nerves* pass.

cccc, The Holes thro' which the *Nerves* have their *exit*.

FIG. IV.

Shews the three little Bones in the *Os Petrosum*.

A, *Os squamosum*.

B, *Processus Zygomaticus*.

C, *Membrana Tympani*.

D, The Bony Circle about the *Tympanum*.

eee, The three distinct little Bones of the *Os Petrosum*.

E, The rest of the *Os Petrosum* cartilaginous.

FIG. V.

Shews the Organ of Hearing.

A, The *Malleus*, with its long cartilaginous Process a, to which the Membrane of the *Tympanum* joins.

B, The *Incus*, with its Process b, likewise cartilaginous.

C, The *Stapes*, not yet in the form of an *Isosceles*.

FIG. VI.

The *Epistropheus*, or second *Vertebra* of the Neck.

AA, The two lateral Bony Processes of the second *Vertebra* of the Neck.

B, Its Body, now appearing Bony.

C, The *Foramen* for the passage of the *Spinal Marrow*.

FIG. VII.

The *Atlas* or first *Vertebra* of the Neck.

AA, The two lateral Bony Processes of the first *Vertebra* of the Neck.

B, The fore-part, as yet cartilaginous.

C, The Perforation for the passage of the *Spinal Marrow*.

Fig. 2.



Fig. 4.

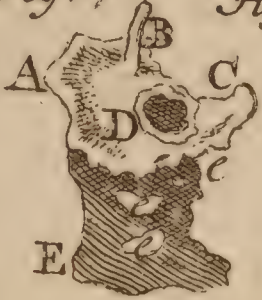


Fig. 5.



Fig. 1.



Fig. 3.

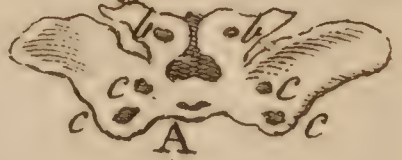


Fig. 6.



Fig. 7.





T A B. XLIX.

The 1st and 4th from Bartholin, the rest from Vesslingius.

FIG. I.

AA, **T**HE Coronal Suture.

B, Part of the Sagittal Suture.

CC, The Squamous Suture of the Os Temporum.

D, Os Frontis.

E, Its Process towards the great Canthus of the Eye.

F, Its other Process to the lesser Canthus of the Eye.

G, Its Perforation, by which Nerves and Blood-Vessels pass to the Frontal Muscle.

H, The Bregma.

I, The Temple-Bone.

K, Its Appendix call'd Styloides.

L, Its Process call'd Mammillaris.

M, Its other Process, which makes the Os Zugale or Zygoma.

N, The first Bone of the upper Jaw.

O, The Second.

P, Its Hole, thro' which passes the Ductus Lachrymalis.

Q, The fourth Bone of the upper Jaw.

R, The first proper Bones of the Nose.

S, The Septum of the Nostrils.

T, The lower Jaw.

V, A Hole in it, which is outwardly small, but larger internally.

X, The Processus of the lower Jaw call'd Corone.

Y, Its other blunt Process, call'd Condylodes.

Z, The Fore-teeth, call'd Incisores.

bb, The Canini.

cc, Dentes molares.

FIG. II.

The Basis of the Skull.

AA, The Os Occipitis.

aa, The Processes of the Os Occipitis to which those of the first Vertebra of the Neck are join'd.

BB, Part of the Temple-Bone.

CC, The Mammiform Process.

DD, The Styloform Process.

EE, The Processus Fugalis.

F, The external Face of the Os Cuneiforme, according to Vesslingius, which is properly the fore-part of the Os Occipitis.

GH, GH, The Processus Pterygoïdes, or Aliformes.

I, The Septum Narium.

KK, The sixth Bone of the upper Jaw.

kk, Two Holes by which a Branch of the fifth pair of Nerves go to the Palate.

LL, Parts of the fourth Bones of the upper Jaw.

m, Shews the four cutting Teeth.

nn, The two Dog-Teeth.

oo, The rest of the Teeth, call'd the Grinders.

FIG.

FIG. III.

The Letters are so confusedly placed in this Copy, that we must refer you to the Original Figure of *Veslingius*.

AA, The Hollow of the *Os Occipitis* within the Skull, in which the *Cerebellum* is receiv'd.

B, The internal Face of the *Os Sphenoides*.

CC, *Os Ethmoides*.

D, The Cavity of the Bone of the Forehead above the Nose.

aa, The first Hole of the *Os Sphenoides* or *Cuneiformis*.

αα, The second Hole in the same Bone.

bb, The third.

cc, The sixth.

†, The seventh.

dd, The fifth Perforation of *Os Cuneiforme*.

ee, The first Perforation of the Temple-Bone.

ff, The stony Process of the Temple-bone.

gg, The third Perforation of the Temple-bone.

hh, The fourth and fifth Perforation of the *Os Occipitis*.

FIG. IV.

The top of the Skull.

A, The Coronal Suture.

B, The Sagittal.

CC, The Lambdoidal Suture.

D, The *Os Frontis*, or Forehead-bone.

EE, The *Ossa Sincipitis*, or *Bregmatis*.

F, Part of the *Os Occipitis*.

FIG. V.

Shews the Back-parts of all the *Vertebrae* of the Neck together.

FIG. VI.

A, The first *Vertebra* of the Neck, call'd *Atlas*.

aa, Shews the two *Sinusses* that receive the *Occiput*.

bb, The transverse Processes; in which are *Foramina*, thro' which Blood-Vessels pass to the Head.

FIG. VII.

The second *Vertebra* of the Neck.

a, Its Process call'd *Dens*.

b, Its double *Spine*.

FIG. VIII.

Some *Vertebrae* of the Back view'd behind.

aa, Their transverse Processes.

BB, Their Spinal Processes.

CC, The Bodies of the *Vertebrae*.

FIG. IX.

A, The back-parts of the upper, and B the lower *Vertebrae* of the Loins.

CCC, Their transverse Processes.

DD, Their oblique descending Processes.

FIG. X.

One of the *Vertebrae* of the Loins view'd from behind.

a, The

fig. 2.



TAB. XLIX.

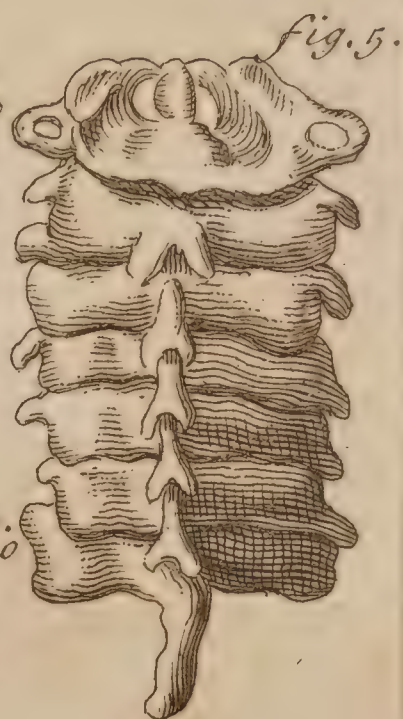
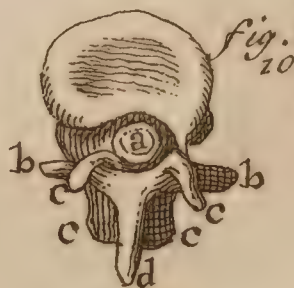
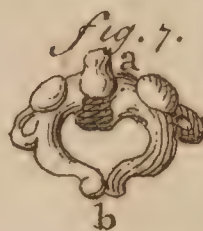


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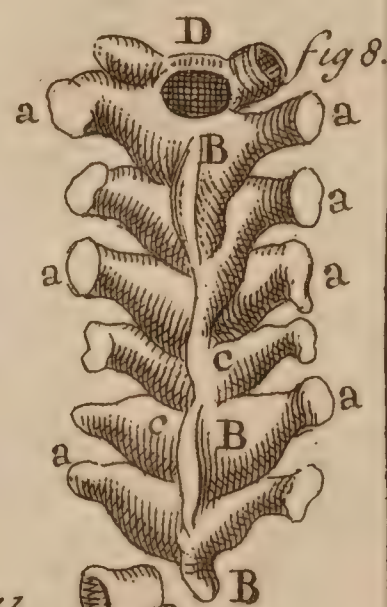
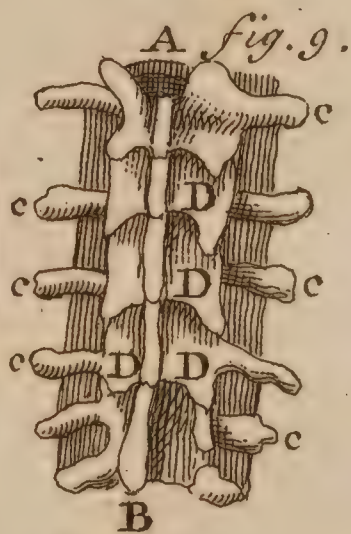
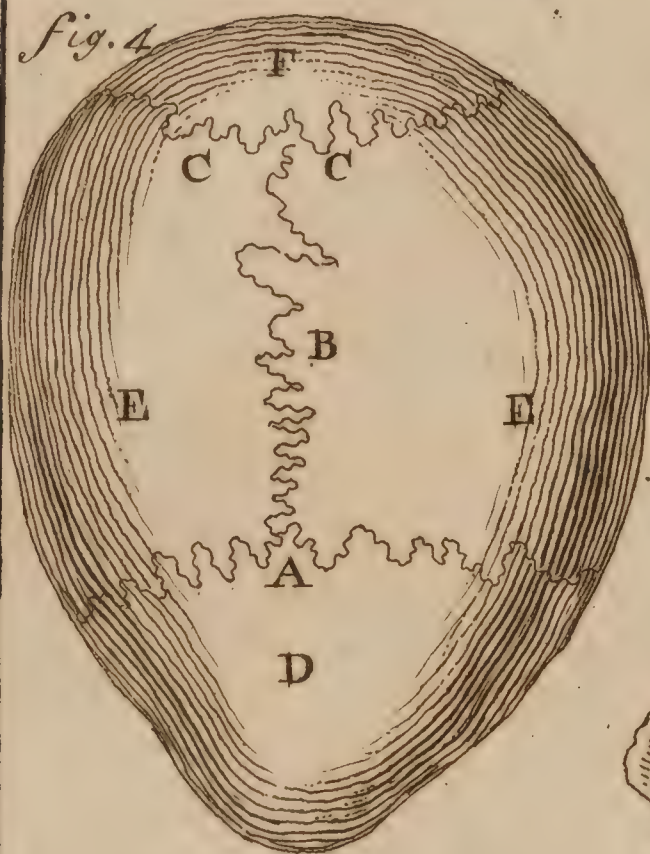
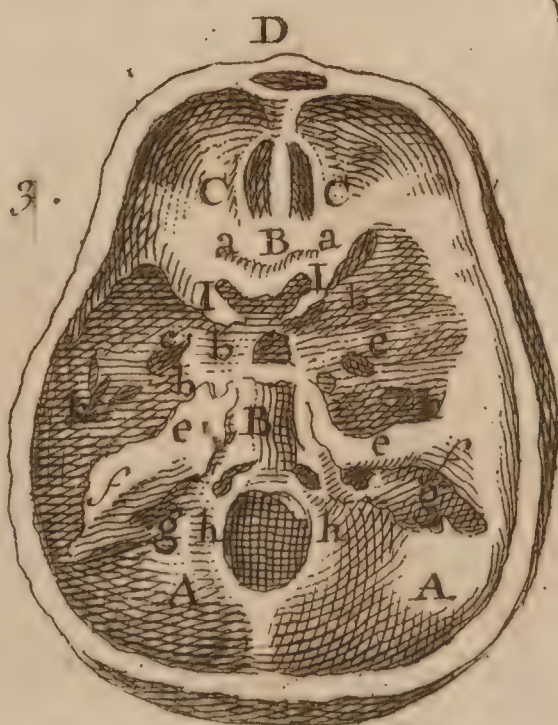


fig. 3.



a, The great Hole for the Spinal Marrow.

bb, The transverse Processes.

cc, The oblique Processes.

d, The sharp Process call'd the Spine.

FIG. XI.

The inside of the *Os Sacrum*.

aaa, The Holes for the Nerves.

b, The three Bones of the *Os Coccygis*.

a,e,i, Shews the Head of the Thigh-bone, and

bb, A side-view of the *Vertebra* of the Loins of some *Quadrupeds*.

T A B. L.

Fig. i. very ill copy'd after Vesalius, the rest from Vesslingius.

FIG. I.

Shews the Skeleton of a Man.

AA, The insides of the *Scapula*.

BB, Both the *Clavicles*.

C, The *Shoulder* bone, or the Bone of the Arm.

aa, The upper *Appendix*, or Head of the *Os Humeri*.

b, Its external *Tubercle*.

c, The internal *Tubercle* of the *Os Humeri*.

DD, *Radius*.

EE, *Ulna*.

FF, The eight Bones of the *Carpus*.

GG, The *Thumb*, compos'd of three Bones.

HH, The *Metacarpus*, produced of four Bones.

II, The four *Fingers*, each consisting of three Bones.

KK, The *Thigh*-bones.

LL, *Patella*, or the *Knee*-pan.

dd, The *Head* of the *Thigh*-bone, or *Appendix superior*.

ee, The *Neck* of the *Thigh*-bone.

ff, *Trochanter major*.

gg, *Trochanter minor*.

hh, The *Appendix*, or lower Head of the *Thigh*.

MM, *Tibia*.

NN, *Fibula*.

ii, *Malleolus externus*.

KK, *Internus*.

OO, The seven Bones of the *Tarsus*.

PP, The five Bones of the *Metatarsus*.

kkkk, The Bones of the *Fingers*, of which three compose the *Thumb*, and as many each *Finger*.

FIG. II.

A, *Clavicula*.

a, The little head of the *Clavicle*, which is receiv'd in a shallow *Sinus* on the top of the *Sternum*.

b, The end of the *Clavicle*, by which it is join'd to the *Spinal Process* of the *Scapula*.

FIG.

F I G. III.

B, *Scapula*, or Shoulder-blade.
 c, The *short* Process of the *Scapula* receiving the Shoulder-bone.

d, The *Process* of the *Scapula*, call'd *Coracoides*, partly seen.

e, The *Spinal* Process of the *Scapula*.

f, The *upper* Angle.

g, The *lower* Angle.

h h, The *Basis* of the *Scapula*.

F I G. IV.

C, The *back-part* of the *Os Humeri*.

D, The *upper* head of the same.

E, Its *lower* head.

g, The *Process* of the *Ulna*, commonly call'd the *Elbow*.

H, The *Ulna*.

L, The *Radius*.

F I G. V.

The *eight* Bones of the *Carpus*.

F I G. VI.

A, The *inside* of the *Os Ilium*.

B, Its *Acetabulum*, which receives the head of the *Thigh-bone*.

C, *Os Ischii*.

D, *Os Pubis*.

F I G. VII.

C d, The *back-part* of the *Thigh-bone*.

a, Its *Head* or *upper Appendix*.

b, *Trochanter major*.

c, *Linea aspera*.

G, *Trochanter minor*.

ee, The *Heads* of the *lower Appendix*.

f, Part of the *Patella*,

F I G. VIII.

D, The *Tibia* view'd behind.

G, *Malleolus internus*.

E, *Fibula*.

g, *Malleolus internus*.

h, *Malleolus externus*.

ii, The *Appendix* of the *Tibia*.

F I G. IX.

A, *Astragalus*.

B, The *Os Calcis*.

c, *Os Cymbiforme*.

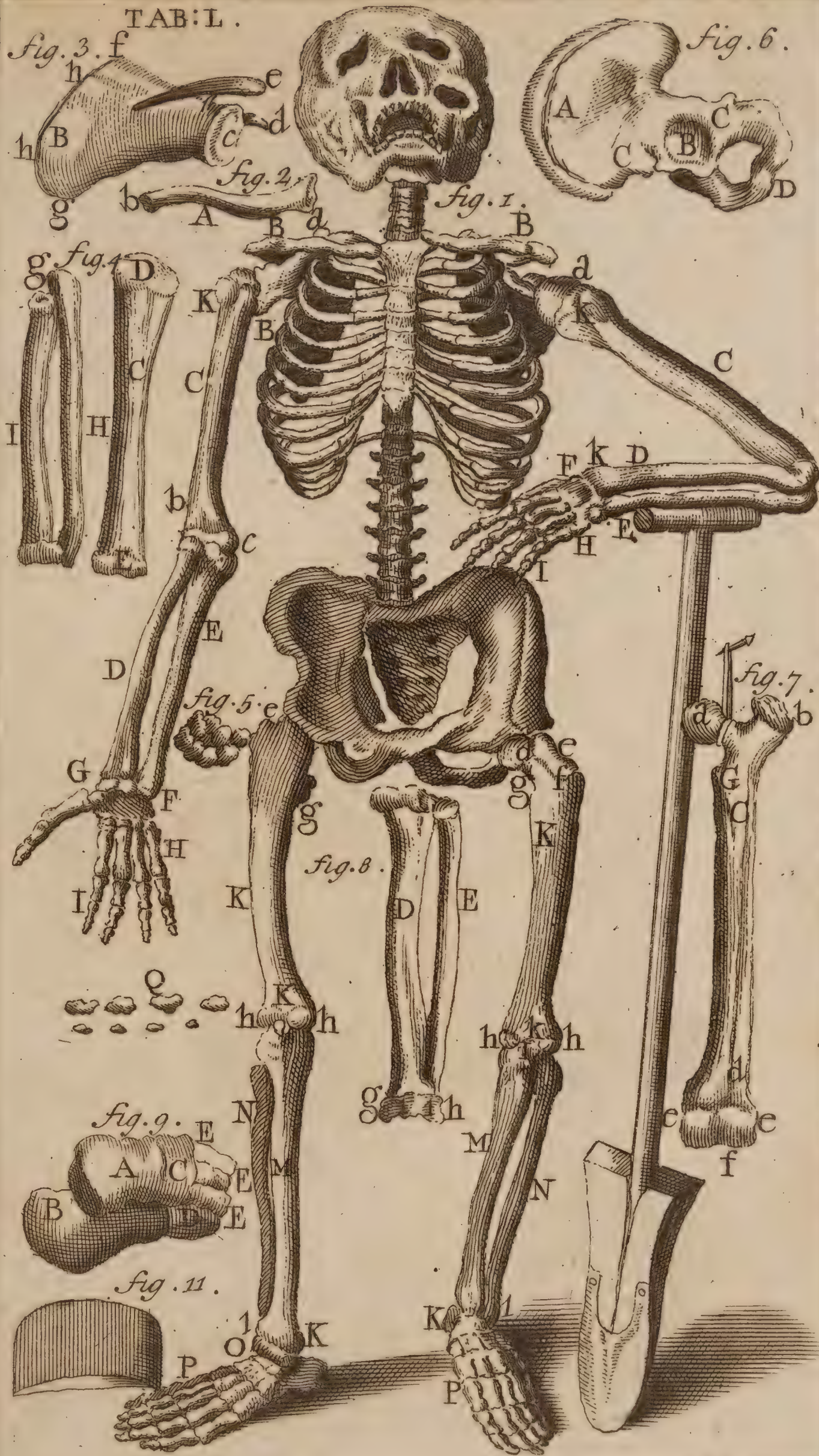
D, *Os Cubiforme*.

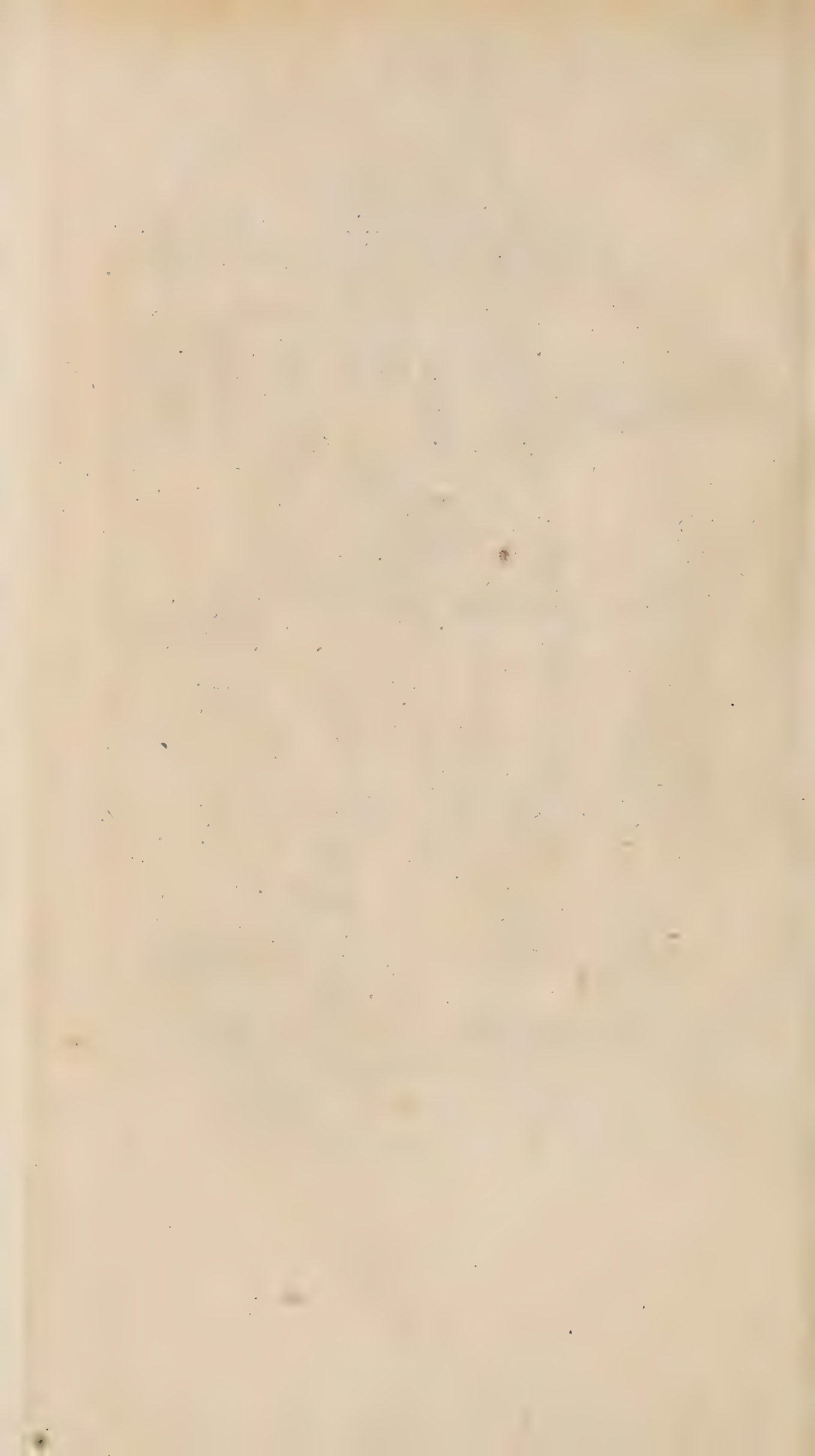
EEE, The three *Ossa Cuneiformia*.

F I G. X.

Shews a piece of the *Nail*, view'd with a *Microscope*; in which many little *Furrows* are seen.

TAB:L.





T A B. LI.

SHEWS some Anatomical Instruments, but especially the *Syringe*, by which Water is easily injected.

AA, A Brass *Syringe*, holding 20 Ounces of Water.

B, The Pestle or *Embolum*.

CCC, A flexible Leathern-Pipe, very useful in Dissection. *These Letters of Reference are wanting in the Figure.*

D, The Mouth of the Leathern-Pipe, compassed about with a brass Tunnel, to which the Pipe IIIS and others may be fitted.

EN, Two Cocks by which the Liquor goes in or out. For when the Pestle B is in the *Syringe*, and the Cock E is stopt and N open, the Liquor will easily pass into the *Syringe* by the Pipe GG: If the Pestle B be drawn out, and the Cock N stopt and E open, the Liquor contain'd in AA E is brought out at D.

F, A Brass-Pipe join'd to AA that the Water GG may be drawn into AA.

GG, A Leathern-Pipe join'd

close to F; thro' which any Liquor it is put into, ascends into the *Syringe* AA.

H, Its brass Mouth.

III, A Silver or Brass-Pipe to be put upon the Mouth D, that the Liquor may go from CC through III, into the Part that it is to be sent to.

S, The Mouth of the Pipe made very small, that it may pass into the Lacteal Vessels and Chyliferous Ducts.

L, The Mouth of the Pipe, to be fasten'd to the Mouth D, which skews, but with much trouble.

MM, Two Loops by which the *Syringe* is fasten'd to the Table, thro' whose holes a Nail is driven to make it immovable.

.O, A little ivory or wooden-hafted Knife, having two edges, to separate the Skin and Muscles.

P, A proper Knife to cut any Part.

Q, A crooked Knife, with which the little Vessels and Coats of the Eye are dissected.

RR, A Blow-Pipe.

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